

TRAIL &
Landscape

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BOTANICAL GARDEN



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The Ottawa Field ~ Naturalists' Club

— Founded 1879 —

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Objectives of the Club: To promote the appreciation, preservation and conservation of Canada's natural heritage; to encourage investigation and publish the results of research in all fields of natural history and to diffuse information on these fields as widely as possible; to support and co-operate with organizations engaged in preserving, maintaining or restoring environments of high quality for living things.

Club Publications: THE CANADIAN FIELD-NATURALIST, a quarterly devoted to reporting research in all fields of natural history relevant to Canada; TRAIL & LANDSCAPE, providing articles on the natural history of the Ottawa Valley and on local Club activities five times a year; and THE SHRIKE, a bimonthly newsletter on birdwatching in the Ottawa-Hull area, available by separate subscription.

Field Trips, Lectures and other natural history activities are arranged for local members; see "Coming Events" in this issue.

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from the Editor...

First, Bill, Peter and I want to express our appreciation to the many people who contributed to *Trail & Landscape* this year. Thanks to all of these volunteers, this volume has the largest number of pages ever. We also want to thank the Directors of the National Museum of Natural Sciences for the use of their office for typing and proofreading over the last 17 years. Even now that we have a word processor, we hope to continue to accept the hospitality of the Director's office for our proofreading sessions.

For those of you who missed the Club's Publication Policy in *The Canadian Field-Naturalist* last year (97(2): 231-234), we reprint below the parts of the Policy most directly pertinent to the production of *Trail & Landscape*.

If you have any comments or questions regarding the Publications Policy, please direct them to Ron Bedford, Chairman of the Publications Committee (733-8826).

Joyce Reddock

from

The Ottawa Field-Naturalists' Club Publications Policy: February 1983

The Ottawa Field-Naturalist's Club currently publishes three periodicals and, from time to time, books or monographs as Special Publications. The three periodicals differ in purpose and scope. *The Canadian Field-Naturalist* is essentially a scientific journal devoted to the publication of refereed papers concerned with natural history that is relevant to Canada. It is the official organ of the Club and appears quarterly. *Trail & Landscape*, with five issues annually, is a less formal periodical geared to providing articles pertaining chiefly to the natural history of the Ottawa area and to providing information aimed at the local membership. *The Shrike*, a specialized bi-monthly newsletter, reports to the bird-watching community on

bird sightings in the Ottawa District. Special Publications embrace material better suited to separate publication.

TRAIL & LANDSCAPE

Although the information presented in *Trail & Landscape* must be factually correct, its manner of presentation will usually be less rigorously structured and more discursive than for *The Canadian Field-Naturalist*. This reflects the more casual and less scientifically-oriented readership of *Trail & Landscape* and this publication's conscious effort to educate interested lay persons concerning the natural history of the Ottawa area.

Trail & Landscape is published five times a year and is available to all local members, on demand to members outside the Ottawa district, and to institutions on subscription. It is managed by annual budget.

(1) - Objectives:

- (a) to encourage the membership to make and to publish natural history observations that are related to the Ottawa District.
- (b) to promote and to report on Club activities and the participation of the membership in such activities.
- (c) to provide information and articles of interest regarding the natural history of the Ottawa area.
- (d) to present, analyze and comment on natural history issues (such as conservation) of significance to the Ottawa area.

(2) - Achievement of the Objectives:

Useful indicators for the achievement of the objectives for *Trail & Landscape* include the following:

- (a) unsolicited comments by members on an issue-by-issue basis.
- (b) the effort required by editorial staff to obtain sufficient appropriate material.
- (c) the results from member surveys.
- (d) citations in other publications.
- (e) adherence to a regular publication schedule.

(3) - Content and Readability:

Trail & Landscape will continue to provide a balanced mixture of natural history articles oriented towards people, activities, and education. ▢

A Macoun Field Club Trip to Kettle Island

Stephen J. Darbyshire, Alix Letourneau and Michael Manga

An enthusiastic trio set off across the ice of the Ottawa River on the morning of February 14th, 1984, in the general direction of Kettle Island. Although it was only a short walk from where we left the car along Jacques-Cartier Boulevard in Pointe Gatineau, the island was invisible through the thick fog. We followed the trail of the Ski Marathon and turned down a track that people drive along to get to a favourite ice fishing spot along the island's south shore. We soon found the gray forest at the western tip of the island looming before us. The snow was wet and heavy, and consequently it became slow going in snowshoes.

Although Kettle Island is a site in the region that has had minimal human disturbance, winter's ice and the availability of mechanized transport now bring many to the island. The numerous snowmobile tracks did make some of the walking easier. We noticed that some trees had been cut down near the western tip, but fortunately these activities do not seem to have penetrated into the interior yet. There have been many changes and visitors on Kettle Island since James Fletcher visited the island to collect plants on May 5th, 1878.

A number of naturalists have visited the rich forests of this island of alluvial deposits. Those who visit in the summer are tormented by insects and have considerable difficulty negotiating the sandy ridges and wet gullies that are often a tangle of vines, shrubs and ferns. Wild Grape (*Vitis riparia*), Bittersweet (*Celastrus scandens*), Moonseed (*Menispermum canadense*) and Poison Ivy (*Rhus radicans*) along with raspberries occur in abundance on drier sites. These plants, along with Speckled Alder in the wetter sites, all add many difficult steps to a naturalist's walk. Given that most people will visit Kettle Island for only one day, they will not be able to explore much of the island in a single visit. There are many open forests of Butternut (*Juglans cinerea*), Hackberry (*Celtis occidentalis*), Blue-beech (*Carpinus caroliniana*), Hop Hornbeam (*Ostrya virginiana*), maples and ashes.

As we headed eastward, we found it easy to travel along the tops of the many east-west ridges. As we passed through an area where Trembling Aspen dominated the ridges and mixed maple (*Acer saccharinum* x *A. rubrum*) dominated the wet gullies, we spotted a Barred Owl flapping silently through the tops of the maples. It landed close by, and, although it showed limited interest in our squeaking, it did not mind us moving in for a closer examination. As we stood watching the owl, we noticed a small group of shrubs with large orange-brown fruits hanging from the branches.

When we examined the curious shrubs at close range, we came to the conclusion, rather slowly, that we were looking at Bladdernut (*Staphylea trifolia*).

Bladdernut is known to reach its northern range limit in Ontario at Ottawa (Soper and Heimburger 1982; fig. 1). Records from the Ottawa District, until now, have been only from the Ontario side of the Ottawa River (Gillett and White 1978; fig. 2). Dr. Dore (1962) described the colony at Billings Bridge in detail. Specimens from this site were first collected by James Fletcher just over three weeks after his visit to Kettle Island. Dr. Illman (Illman and Dugal 1980) reports on a small colony along the Rideau River on the Carleton University campus where it exists as the last vestige of the long-known Billings Bridge population. In the same article Dr. Illman reports on a stand along the Jock River south of Fallowfield. The only other stand known in the District (excluding John Macoun's collection south-east of Casselman) was found along the North Castor River south-west of Edwards (Illman and Dugal 1980). At the Jock and North Castor sites there is only a single plant known. The Jock River plant and the small colony at Carleton University produce apparently viable fruit. Although we did not count the shrubs at the time, we estimate from memory that the colony contained 20-25 mature plants growing close together and producing plenty of fruit.

As the name *Staphylea trifolia* indicates, the leaves are divided into three leaflets not unlike Poison Ivy. The large



Fig. 1. The distribution of Bladdernut (*Staphylea trifolia*) in Canada and adjacent Michigan. All known sites from the area covered by the map are plotted. Data was compiled from Billington (1949), Dore (1962), Soper and Heimburger (1982), and herbarium specimens (DAO and CAN).

red buds and opposite branching are also distinctive features. The bark of older twigs, branches and stems is streaked with white markings on a grayish background. (Note the twig in the photograph in Trail & Landscape 14(4): 113 (1980).) The fruits are the most distinctive feature (fig. 3) with several (2-5) shiny, light-brown seeds loose in a greatly-inflated membranous capsule. Combinations of the characters allow this shrub to be easily recognized in the Ottawa District. Dr. Illman (Illman and Dugal 1980) provides an excellent description of the flowers.

All the known locations of the shrub in the District are along river shores in alluvial flood areas and often under spring high-water. The fruit bladders are winter-persistent and probably are dispersed by spring floods. The violent high water of spring may knock the bladders from the shrub and carry them some distance before they sink or are stranded by receding water. Short distance dispersal occurs if the membranous capsule splits enough at the bottom to allow the seeds to fall out as the capsule blows in the wind.

Bladdernut is easiest to find in the winter because the large, distinctive fruits are persistent and visible through the surrounding vegetation. All the fruits examined from the Kettle Island population were more or less intact, but a subsequent investigation of the Jock River site revealed many fruits that had been "pecked" open on the side near the top and the seeds removed. The seeds are too large for many birds, but Evening Grosbeaks, Northern Cardinals, Blue Jays, and even mice, might be capable of removing seeds in this manner. It is also interesting to note that rarely do more than two fruits form from a panicle that typically has 10-20 flowers.



Fig. 2. The distribution of Bladdernut in the Ottawa District. Data compiled from herbarium specimens (DAO and CAN).

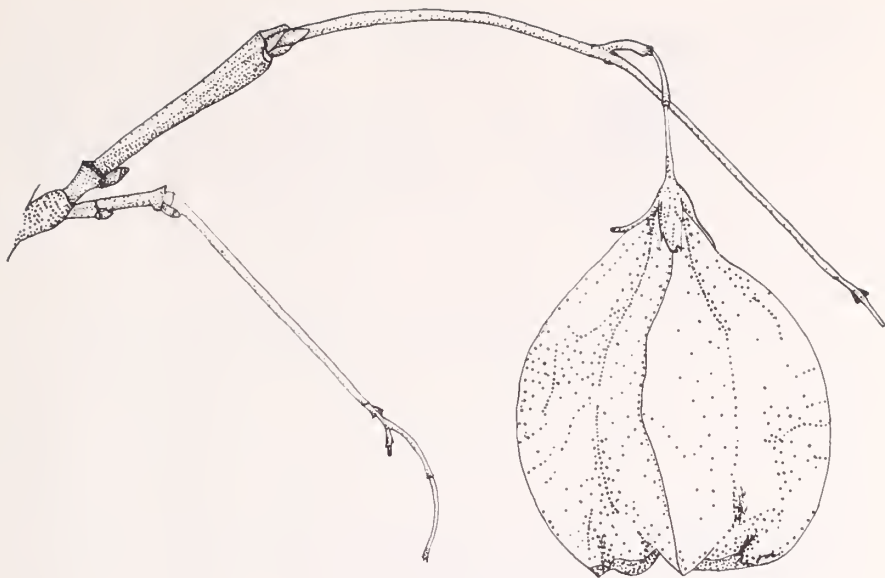


Fig. 3. Twig and fruit of Bladdernut from Kettle Island.
Drawing by Michael Manga.

In his 1962 article, Dr. Dore formally described two forms of fruit present on different shrubs at the Billings Bridge site, forma *trifolia* and forma *pyriformis*. It is interesting to note that the plant at the Jock River site bore pear-shaped fruit, forma *pyriformis*, and all the fruit seen on Kettle Island were spherical and without a neck, forma *trifolia* (fig. 3), indicating that they originated from seed of different genetic stock. More colonies may yet be found on Kettle Island, and some may turn out to be forma *pyriformis*.

The associated flora described by Dr. Illman and Albert Dugal (1980) - Moonseed, Carrion-flower and Prickly-ash - are also to be found on Kettle Island (Darbyshire 1981). There are many treasures for the naturalist, and it is well worth the effort to make one or more visits. It is a place unlike any other in the Ottawa District; a unique experience at any time of the year.

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Snow Goose

An old man, with more years of birds
than I have years of life,
once told me of the lone snow goose
who travels in among the noisy angles
of straggling Canadas in fall.
And since that time, I conjure up
V-patterns in the bluest skies
and tune my ears to insistent barking
on the quietest of fading days.
At dawn I hide along the edge
of bush and beaver pond, bringing
morning sounds to silent flocks.
By day I search the ploughed fields
- waterlogged against the winter,
brief resting place on long journeys -
search for the stranger nestled deep
between brown feathers.
As the light pales and shadows grow,
I haunt the grassy mounds of river bank,
contorting neck and shoulder
to watch wings' sudden dip and shiver,
acrobats' descent to welcoming shallows.
And whether it is exile, solitude
or grief that cries for recognition,
sometime before my dying days
I need to find the lone snow goose.

Linda Jeays

Recent Bird Sightings



Christine Hanrahan & Bruce Di Labio

The summer of 1984 probably will be remembered for the above-average temperature of June and the above average rainfall of early August. The latter did little to help the already high water levels along the Ottawa River and in the lagoons. As a result, the usual shorebird hot spots were not!

Only one true rarity occurred in a summer generally devoid of unusual sightings. A Lark Sparrow made a brief appearance in mid-June; however, it was seen by only a few lucky individuals. A Great Egret and a Red-bellied Woodpecker, while interesting, did not have the same cachet.

June, July and August, the three months covered by this report, encompass an amazing array of activity. The breeding season is, of course, predominant, and the fall migration is well underway by mid-August. But the tail end of the spring migration also occurs in early June, causing a conundrum for atlassers who may wonder if certain species are late migrants or summering birds.

The Ontario Breeding Bird Atlas project (OBBA) has contributed greatly to our knowledge of breeding birds in this region. Certain species are now known to be more common and certainly more numerous than was previously suspected. This is especially true for Least Bittern, Sedge Wren, Grasshopper Sparrow and Clay-coloured Sparrow.

Cormorants: The Double-crested Cormorant is definitely on the increase as a summer resident. Ten years ago it was an unusual sight; this year up to 11 or 12 could be seen along the Ottawa River at any given time.

Hérons and Bitterns: Cattle Egrets have become almost regular spring vistors in recent years. At least two birds were found in early June, and one of the May birds lingered until June 3rd along Regional Road 8 near Moodie Drive. The two June birds were both observed on the 2nd of that month, one in the vicinity of Munster Hamlet and one at Winchester. One Great Egret made a brief appearance near Munster Hamlet on July 15th. Both egret species were photographed.

Least Bitterns have been found with increasing frequency by

participants in the Breeding Bird Atlas project, indicating that this species, although elusive, is more common than was previously thought. Locations include the Dwyer Hill area.

Waterfowl: Canada Geese are visibly increasing both as breeders and summer residents. This summer saw successful nesting at Winchester, Russell, Munster, Shirleys Bay, and at Bell Northern Research on Moodie Drive where two families were raised on a small artificial pond. Up to 100 Brant were observed flying north past Shirleys Bay on June 3rd. Two other birds remained at Britannia until June 13th.

Mallards continue to be prolific breeders while the Black Duck appears to be on the wane. Hybridization of these two species is undoubtedly a contributing factor in the decline of the Black as a separate species.

Gadwalls were exceptionally scarce this summer; only one was reported, this on June 3rd at Shirleys Bay.

Summering Lesser Scaups are observed more frequently of late. This year birds were noted at both the Russell and Almonte sewage lagoons and at Nepean Bay, where they have twice bred (in 1971 and 1983). A Greater Scaup was seen on July 18th at Nepean Bay. Separation of these two species is tricky as most birders know; discernment should be the key word here.

Ruddy Ducks were present at three locations this summer: a lone female was seen on June 15th at Richmond lagoon, while a male was observed at Casselman on July 27th (probably one of a pair present since May 27th). A second male was observed at Shirleys Bay on July 29th. This species is notoriously secretive thus making it difficult to judge whether their presence is temporary or permanent during the summer.

Late July saw an increase in Hooded Mergansers, while from mid-August onwards Common Goldeneyes became more noticeable.

Raptors: A late Rough-legged Hawk was observed on June 7th at Mer Bleue. Peregrine Falcons and Merlins are rare but regular visitors, and single birds of both species were observed at Shirleys Bay.

Shorebirds: The north-south movements of certain shorebird species sometimes overlap making it very difficult to decide whether an observed bird is a late spring or early fall migrant, or even a summering individual. Solitary Sandpipers, for example, were recorded on June 7th and again on June 25th. Lesser Yellowlegs were observed on June 8th and 27th, while Least Sandpipers were noted on June 9th and 29th. Were these late departing birds, early arriving birds, or summering individuals?

High water levels along the Ottawa River and in the lagoons have had an adverse effect on the fall shorebird migration. Unable to find suitable stopover places, many birds continued past our area. In spite of the less-than-perfect conditions, however, some interesting fall migrants were observed: two early species were a White-rumped Sandpiper and a Stilt Sandpiper. The true highlight was a Buff-breasted Sandpiper on

August 18th south of the airport, which stayed for at least a few days. American Golden Plovers, Baird's Sandpipers, Ruddy Turnstones and Northern Phalaropes also occurred during August, along with the more common Sanderlings, the two yellowleg species, Least Sandpipers and Semipalmated Sandpipers. Wilson's Phalaropes are becoming a more regular sight during the summer at the various sewage lagoons. Breeding was confirmed this year at the Russell lagoon when four young were observed and photographed. This observation constitutes the second breeding record and the first captured on film for this area. In 1975 an adult with young was recorded at the Almonte lagoon (Hince 1975). Breeding was presumed to have occurred at three other locations because behaviour indicative of such activity was observed.

Gulls and Terns: A late Great Black-backed Gull was seen at Deschênes on June 3rd. Ring-billed Gulls moved to safer territory this year after last year's unsuccessful nesting attempts at Nepean Dump, where nests and eggs were plowed under continually by the bulldozer. A Little Gull was sighted flying west along the Ottawa River at Constance Bay on August 26th, one of the few fall records for this species.

A Caspian Tern was seen on July 15th over the Munster sewage lagoon. This species has been observed only infrequently away from the Ottawa River. Common Terns continue to be scarce, although a small colony was discovered near Arnprior just outside the 50 km radius of the Ottawa District.

Red-bellied Woodpecker: One individual was observed over a period of a few weeks in June near Fallowfield Road, the second summer record for this species.

Flycatchers: Yellow-bellied Flycatchers were still migrating in early June as two records indicate. One bird was observed on June 4th at Innis Point, while a second was seen at Mer Bleue on June 5th. A much later bird recorded on June 15th, also at Mer Bleue, might have been a potential breeder.

OBBA records show that Willow Flycatchers are relatively widespread in areas of suitable habitat. Several locations have been found in the Winchester Bog area amongst other places.

Swallows: All swallow species were noted in the summer period. Noteworthy was a large mixed flock of about 20,000 observed just east of Thurso on July 31st. A concentration of over 3,000 Purple Martins was noted at Lemieux Island on August 18th.

Ravens: The occasional Common Raven can be seen flying along the Dunrobin Ridge and past the Champlain Lookout. Most unusual were three ravens recorded over a period of days in the Greens Creek area.

Sedge Wren: Again primarily due to the atlassing work, this species has been found in a number of locations and is certainly

more common than was heretofore supposed.

Northern Mockingbird: The poor showing of this species in both winter and spring was rectified in the summer when seven or eight reports were received for Ottawa and environs.

Thrushes: Both Swainson's Thrush and Gray-cheeked Thrush were late arriving in May. Consequently a few of both species were noted in the region in early June.

Blue-gray Gnatcatcher: At least two observations were made this summer, a total about par for the species over the last few years.

Loggerhead Shrike: The decline of this species, noted and remarked on by most birders, continues. However, it is encouraging to report that they were observed in at least five locations south of the city including two family groups, one near Munster and one near Crysler.

Vireos: A few singing male Yellow-throated Vireos were heard, one on June 7th in the Carp Hills and one near Champlain Lookout on July 23rd.

Warblers: A few of the later-migrating warblers were still moving through the area in the first part of June, including Tennessee, Magnolia, Bay-breasted, Blackpoll and Mourning Warblers. The usual breeding warbler species were noted in good numbers throughout our area in suitable habitat: Black-and-white, Nashville, Yellow and Chestnut-sided Warblers, Ovenbird, Northern Waterthrush, Common Yellowthroat and American Redstart. Again, the OBBA project has found a number of Golden-winged Warblers, many outside the 50 km radius, but locations within included Kanata and the Marathon area.

A relatively slow start to the fall warbler migration was due in part, perhaps, to the lack of cold fronts pushing warblers south. Nonetheless, the regular species have been noted with the following occurring in some abundance: Cape May Warbler, Bay-breasted Warbler, and, of course, the ubiquitous Yellow-rumped Warbler. Look for more details on fall warblers in the next issue of *Trail & Landscape*.

Blackbirds: Large concentrations of Red-winged Blackbirds and Common Grackles, numbering in the thousands, have been sighted flocking in the traditional areas (Ramsayville Marsh, Black Bay and Shirleys Bay) since early August.

Northern Cardinal: The first breeding record for this species within the District was in 1974 (Godfrey 1974). Since then the Northern Cardinal has been making definite inroads as a locally common breeder. It appears to frequent residential neighbourhoods well planted with cedar hedges, spruce trees and other conifers.

Finches and Sparrows: House Finches have been moving into our area of late, but not until June 30th of this year was the first breeding record for the Ottawa District confirmed. Since then at least four other breeding pairs have been found with the general population now estimated to be between 40 and 50 birds. This year they have also been recorded outside the city at Casselman and Richmond. In winter, House Finches seem to favour backyards in which cylinder feeders have been set up. Why not put one up and see if this theory holds true! After successful breeding during the April-May period, a few Pine Siskins lingered in our region throughout the summer with reports from various locations.

The extraordinarily large cone crop abundantly obvious in both White Pines and White Spruces bodes well for an exceptional crossbill invasion this year. A few reports of both White-winged Crossbills and Red Crossbills in the Ottawa area were recorded this summer, including White-winged Crossbills in the Carlsbad Springs area. Algonquin Park, however, has seen good numbers of both species, while Pembroke and the Otter Lake (Quebec) area have recorded White-winged Crossbills.

The OBBA project has yielded more records for Rufous-sided Towhee, Grasshopper Sparrow and Clay-coloured Sparrow, signifying once again that given suitable habitat these species are more widespread than was formerly suspected. Some locations are: Rufous-sided Towhees near Fitzroy Harbour and Marathon, Grasshopper Sparrows near Greely, and Clay-coloured Sparrows near the Winchester Bog.

The most interesting occurrence of the summer period was the Ottawa District's first record of a Lark Sparrow. This primarily western species was found just northeast of Dunrobin along the Sixth Line near the Thomas Dolan Parkway on June 13th. It was first noticed in mid-morning feeding around a tree nursery and in adjacent fields. Unfortunately it was rather secretive and eluded most would-be observers. This species breeds mainly in the prairies and only sporadically in southern Ontario (Godfrey 1966). All three Kingston records (Weir and Quilliam 1980) for Lark Sparrow were for the fall, thus it was to be expected that should this species occur in our region it would likewise be in the fall.

For the second consecutive summer Lincoln's Sparrows were observed on territory in the Mer Bleue; adults were noticed feeding young. (See article on page 246.)

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CORRECTION TO *Recent Bird Sightings* in the September-October issue: on page 187 the sighting of a House Finch in July 1977 at Fitzroy Provincial Park was the first record for the Ottawa District but it was not a breeding record.

The Bottle-brush Buckeye Naturalized in Ottawa

Billie Bridgman and W.I. Illman

On July 18, 1984, Billie Bridgman observed an unusual horse-chestnut-like shrubby plant along the C.P.R. main line on the Carleton University Campus. This 1 1/3 m-high shrub proved to be Bottle-brush Buckeye (*Aesculus parviflora* Walt.), a distinctive southeastern species, the range of which is stated to be "S.C. to Fla. and Ala." by L.H. Bailey (1949). Its occurrence, whatever its method of introduction to its present site, is regarded as worthwhile recording since it has obviously lived for some years in its northerly home in order come to flowering maturity. (Note added Sept. 10: the plant set a couple of fruit; only time will tell whether the fruit are viable.)

This buckeye is characteristically an under-storey shrub, unlike other members of its kind which form rather large trees. The inflorescence is narrow and long (25-30 cm) explaining the common name. Each of the five white petals has a narrow, petiole-like base (claw) as long as the calyx, and the exerted stamens possess coral-pink anthers.

This late-flowering buckeye is listed in *Ornamental Shrubs of Canada* (Sherk and Buckley 1968) as being hardy to zone 4b to the north of Ottawa, and is available from local nurseries for planting here. Nevertheless, it is considered unusual enough and distinctive enough that field naturalists might be on the watch for it - it is likely to become more widely naturalized in semi-shaded dry areas where it can spread slowly by suckers.

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Sherk, L.C. and A.R. Buckley. 1968. Ornamental shrubs of Canada. Canada Department of Agriculture Publ. 1286. 187 pp. □

Guide to the Seabirds of Eastern Canada



As part of a campaign to increase awareness of seabirds, the Canadian Wildlife Service has produced an interesting and informative booklet of the above title. Both the author, A.J. Gaston, and the illustrator, I.L. Jones, are Ottawa residents.

For your free copy, write Publications Division, Canadian Wildlife Service, Ottawa, Ontario K1A 0E7. Multiple copies can be supplied to schools, nature clubs or youth groups.

The booklet is also available in French, under the title *Guide des oiseaux de mer de l'est du Canada*.

Nature Canada Bookshop

The nature enthusiasts on your Christmas list will be delighted with a gift from our unique selection

of books, nature recordings, calendars, bird feeders and many more quality "natural" gifts. Our 1984 Christmas card collection features the images of three Canadian artists — **Edge of the Wood — White-tailed Deer** by Robert Bateman, **The Three Bears** by Don Curley and **Black-capped Chickadee on Mountain Ash** by Marc Barrie. Selected models of Bushnell and Bausch and Lomb binoculars will be on sale until Christmas for 15% off. Also, remember that you can help us spread the naturalist message with our exclusive "Go Wild" and "I'm for the Birds" t-shirts and sweatshirts. Drop in and visit our store weekdays 9-5 and Saturdays 10-4.



The Three Bears by Don Curley

Nature Canada Bookshop 75 Albert Street, Lower Level, 238-6154

Stentor polymorphus

A Fascinating Ciliate from Mer Bleue

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National Museum of Natural Sciences
Ottawa, Ontario K1A 0M8

The Mer Bleue peat bog is a southern outlier of an interesting boreal forest habitat and a haven for a variety of rare plants and animals. As such, it is a valuable local asset for scientific studies, educational programs and natural history observations. Most studies and observations on the bog or its environs have dealt with the more conspicuous elements of its fauna and flora. I would like to recall for you the chance finding of a microscopic organism at Mer Bleue - a large, green, ciliated protist named *Stentor polymorphus* - and tell you something about the habitat in which it is found and its morphology.

The fascination many of us have with microscopic life is probably because we must make a special effort that involves the use of an instrument to visualize the organisms. As a consequence, we become voyeurs, gazing at details of form and even of life's intimate functions normally hidden from view. A recent episode that re-enforced my fascination with microscopic organisms occurred during one of my trips to the Mer Bleue. I went that time, in late July 1983, to examine specimens of the locally rare American Shinleaf (*Pyrola americana*), growing on one of the islands.

I entered the marshy area within the forked tip of Dolman Ridge a short distance west of the beaver pond near the base of the southern branch of the fork (fig. 1). This area lacks a *Sphagnum* mat and is covered in a vegetation consisting primarily of hummocks of several species of grasses and bulrushes with shrubs of alder, willow and meadow-sweet scattered throughout. Shallow water-filled depressions and pools filled with decaying organic matter are interspersed among the hummocks and drained by narrow channels that funnel the flow of water away from the area. It is an interesting habitat with Wild Calla (*Calla palustris*) choking many of the shallow pools, and the Common Bladderwort (*Utricularia vulgaris*) and Twin-scaped Bladderwort (*U. geminiscapa*) occurring in relative abundance in the pools and channels. The Lesser Bladderwort (*U. minor*) is even found here on wet, exposed, muddy surfaces.

It was in this marshy area near the northwest end of the beaver pond that I came across the *Stentor*. At and just below

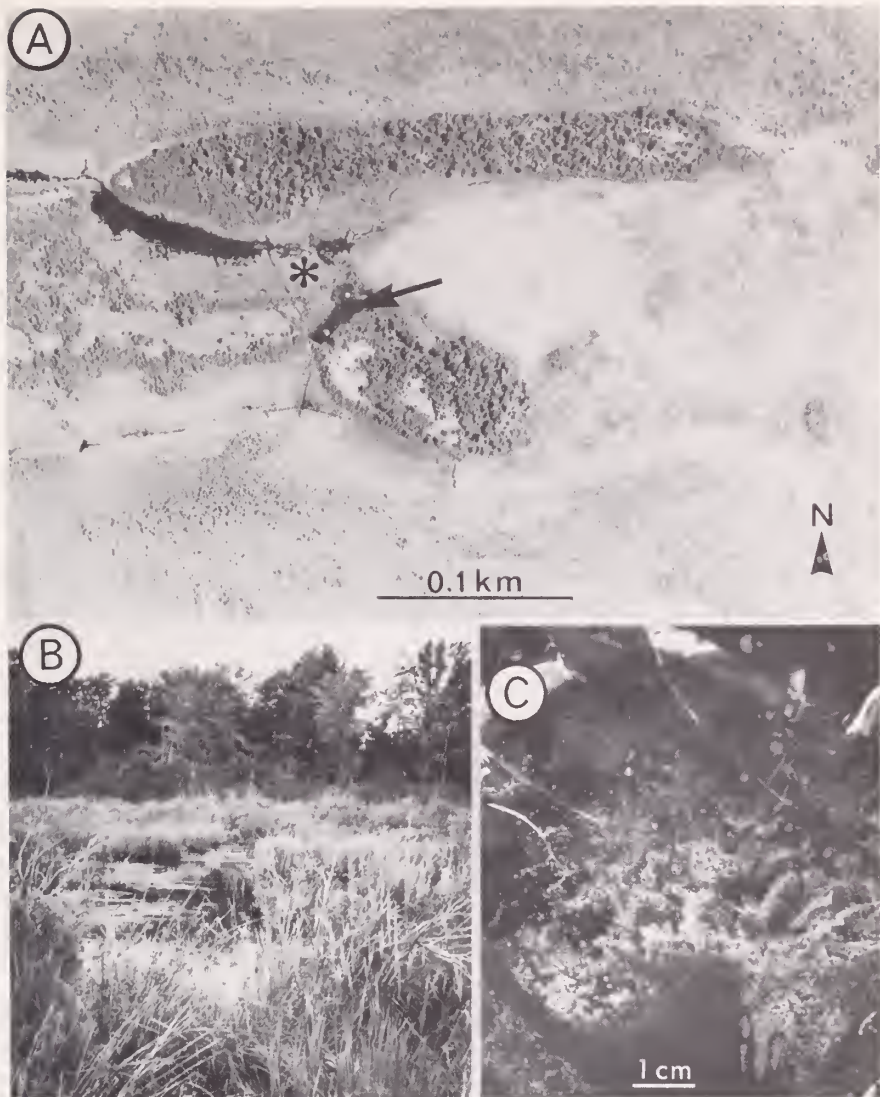


Fig. 1. (A) Aerial view of the forked tip of Dolman Ridge with the *Stentor polymorphus* site indicated by an asterisk and the beaver pond by an arrow.

(B) Ground view of the marshy habitat around the collection locality.

(C) General appearance of the granular aggregates of *Stentor* cells, most of which are submerged and attached to decaying organic matter.

the surface of a number of shallow pools were granular-looking aggregates of green specks floating or attached to the decaying organic debris. I collected some of this material in a small plastic bag but did not realize what I had collected until I examined it under a dissecting microscope in the lab. I subsequently returned in August with a pipette and vials to make a proper collection for further examination and verification by a specialist. On my return, I also recorded water temperatures and took water samples for pH determinations. On that sunny day, the pools averaged about 20 degrees C, and the pH readings ranged from 5.3 to 5.7. These pH values were somewhat higher (less acid) than most of the readings I had recorded a previous year for a number of sites in the bog mat and pools around the central islands (Haber 1979).

Stentor polymorphus, although not the largest of the 13 species recognized on a worldwide basis, is nevertheless impressive in size for a single-celled organism. Its generic name *Stentor* refers to the trumpet or cone-shaped form of the organism (fig. 2) which it can extend to a length of about 0.6 mm. All species of *Stentor* are relatively large and have a considerable ability to elongate and contract their shape. The cell surface is covered with longitudinal rows of cilia that are visible only under a compound microscope. A conspicuous crown of specialized feeding membranelles, visible under a dissecting microscope, encircle the blunt anterior end. The coordinated movements of these membranelles create a spiralling funnel of water that brings bacteria and other food organisms to the oral pouch. Interestingly, the lengthwise bands of green in the cytoplasm, giving *S. polymorphus* its colour, are due to the numerous minute symbiotic cells of the green alga *Chlorella*. In most other *Stentors*, the coloured bands are due to pigmented granules in the cytoplasm.

Stentors are cosmopolitan, occurring commonly in shallow pools. They overwinter in low numbers maintaining minimal feeding activity. Under favourable growing conditions, such as the presence of high levels of bacteria, they may form population explosions ("blooms") in the summer that look like an accumulation of scum. *Stentor polymorphus* has been found in various habitats in Ontario from eutrophic (nutrient rich) pools around Toronto with neutral pH values to the acid, nutrient poor waters in the Muskoka area of the Canadian Shield.

Most of the time, *Stentors* are sedentary, remaining attached by the holdfast at the tapered end of the cell. When swimming, they rotate, describing a spiral path as they move through the water. Although all *Stentors* were thought to rotate in the same direction (Tartar 1961), the Mer Bleue specimens rotated counterclockwise. Observation of the swimming *Stentors* was made easier when I added a drop of methyl cellulose solution. This made the water more viscous and slowed down their movement. Subsequently I could see the feeding membranelles

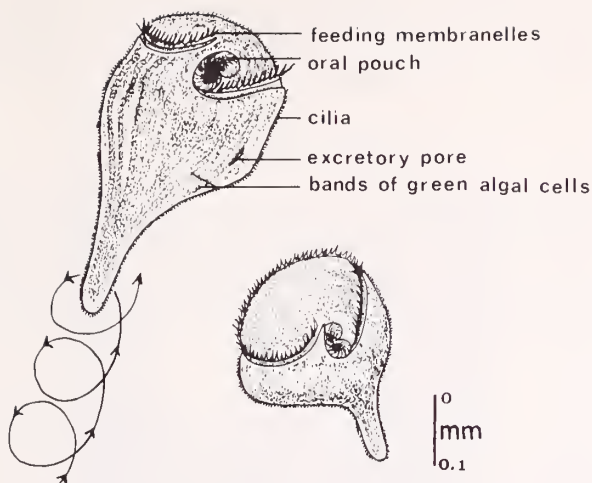


Fig. 2. *Stentor polymorphus* cells from Mer Bleue.

more easily and even observe the discharge of waste particles through a pore in the cell covering.

When I had satisfied my curiosity with the living Stentors, I decided to preserve several samples in a variety of fixatives so that I could send material to Dr. Jack Berger, a protozoologist at the University of Toronto. It was interesting to note how relatively resistant to high concentrations of ethyl alcohol this species was. The cells were still swimming in a normal fashion even in about 50% alcohol. In contrast, a single drop of a formalin-based fixative in 0.5 ml of water caused immediate death with the pointed tail being instantaneously withdrawn and the rounded cells ceasing all activity.

Just as many specialists have found Stentors to be excellent research organisms, an interested student could probably gain some insights into protistan behaviour and structure by studying local populations of *Stentor polymorphus*. This species probably occurs in other marshy areas in the region, is easily collected, and can be cultured and studied following procedures outlined in Tartar (1961).

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The Ring-necked Pheasant in Ottawa

Bruce M. Di Labio

The Ring-necked Pheasant (*Phasianus colchicus*) is a non-native species that was introduced in Ontario in the late 1890s (Peck and James 1983). It gradually became established in various parts of southern Ontario, with the initial breeding stock being both escapees and intentionally-released birds. (Being a game species, they were, and still are, kept in some numbers by game farms and sports clubs.)

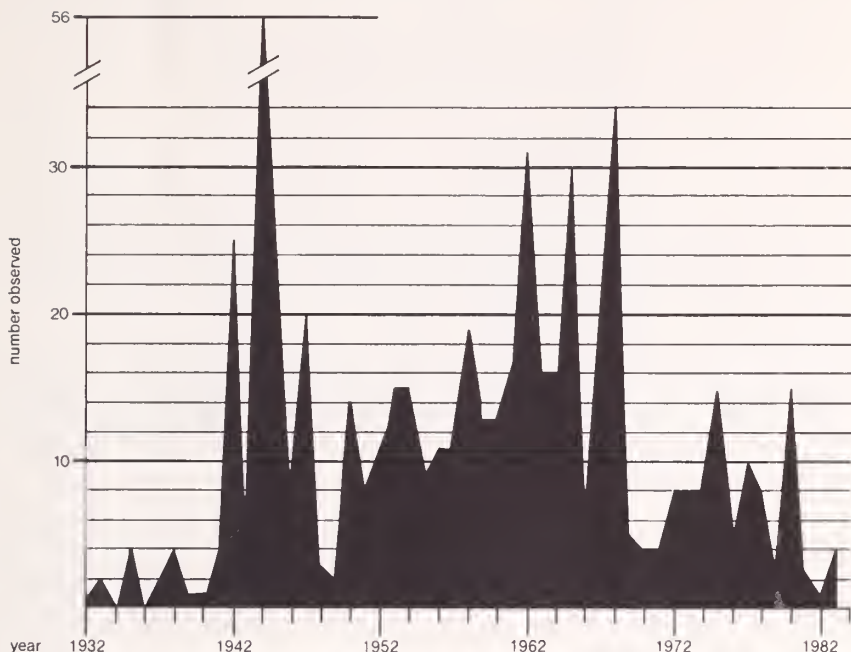
There has been a small resident population in the Ottawa area at least since 1932, and perhaps even since 1930 (Lloyd 1932). The first Pheasant was recorded on the Ottawa Christmas Bird Count in 1932. Subsequent Christmas counts tell of its continued presence in the Ottawa area, in varying numbers, for the last 50 years. During the 1940s, 1950s and 1960s, the numbers fluctuated widely but generally stayed above 10 birds per count. The early 1940s and 1960s provided generally higher counts. Since 1969, however, there appears to have been a decline in Pheasant numbers with counts of more than 10 on only two of the last 15 years. This count declined in spite of an increase in the number of observers during that same time.

The Pheasant is a bird of open farmland, staying close to shrubby ditches, forest edges and other areas covered with brush (Godfrey 1966). Such habitats have been steadily declining in Ottawa over the last 20 years. For example, Dow's Swamp, which used to be a good location to find Pheasants, no longer exists (Reddoch 1978). The shrubby cover in the Arboretum and Vincent Massey Park has been cleaned out; Green Valley Crescent has been built up; and the Riverside Drive - Rideau River area west of Alta Vista Drive has been developed. Today, few if any of these birds are to be found in any of these places.

Pheasant populations outside the city were probably always low due to the severe winter conditions. Deep snow may limit the birds' ability to find food. City birds had the advantage of an artificial food supply available at feeders. This food supply is probably growing. If so, why are Pheasants declining?

Habitat requirements for Pheasants apparently include a great deal of shrubby forest understory and brush tangle. As this habitat is removed through land development and park improvement, those areas become less attractive to Pheasants. Few large areas of good Pheasant habitat now remain in Ottawa, and the consequence, apparently, is fewer Pheasants. The future does not look promising for the continued survival of the Ring-necked Pheasant in the Ottawa area.

Pheasant Records on Christmas Bird Counts 1932-1983



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Some Notes on the Lincoln's Sparrow in Eastern Ontario

Paul Jones and Stephen Gawn

In spring and fall the Lincoln's Sparrow (*Melospiza lincolni*) is a regular if secretive migrant through the Ottawa area. Unfortunately its status during the summer months has been less well known. Godfrey (1966), for example, shows the breeding range well north of Ottawa; yet many years ago Lincoln's Sparrows were present throughout the breeding season at Dow's Swamp (now the north corner of Carleton University campus) (Clarke 1965). In Algonquin Provincial Park, 175 km northwest of Ottawa, the species is described as a rare and local nester (Ministry of Natural Resources).

In summary, the available evidence, although somewhat contradictory, suggested that the sparrow could nest in the Ottawa area. Clearly then, the summer status of the Lincoln's Sparrow was in need of clarification.

During the last two years much progress has been made towards this goal. Two projects have added greatly to our knowledge of the species: the Greenbelt Conservation Studies inventory done for the Conservation Section of the National Capital Commission's Greenbelt Division and fieldwork for the five-year Ontario Breeding Bird Atlas.

In the summers of 1983 and 1984, Lincoln's Sparrows were recorded at several locations in eastern Ontario. In the Mer Bleue the species was found to be a not uncommon breeder. Solid breeding evidence in the form of fledged young was obtained in 1983. Through a breeding bird study in 1984 for the N.C.C., a rough but conservative estimate of 30 to 40 breeding pairs was made. Also in 1984, trips to Alfred Bog for the bird atlas revealed the presence of Lincoln's Sparrows in that bog. An estimate of 50 to 60 pairs was made. Observations of single birds were also made west of Ottawa; for example, in Lanark County in August 1983 (Thomson 1984).

In the right habitat Lincoln's Sparrows are not difficult birds to locate. They frequent parts of bogs where Black Spruce and Tamarack grow in scattered bunches. Areas too thickly treed will have Hermit Thrushes and kinglets, while open areas will have Savannah Sparrows but not much else. The distinctive song is the best method of locating this skulking species; the song can be described as a melodious *Too-too-ti-ti-ti-ti-ti-tlu-tlu-tlu*. If one approaches a nest too closely, the bird responds with a rapid-fire *chip-chip-chip* scolding note. This is a

warning that the intruder should stay back or risk trampling eggs or young.

That this northern species should be found in the two most substantial remaining fragments of boreal habitat in eastern Ontario is perhaps not surprising. Both the Mer Bleue and Alfred Bog contain vegetation typical of areas to the north of us. Black Spruce, Tamarack, sundews and Pitcher Plants all grow in profusion. The breeding of the Lincoln's Sparrow in these "islands" is both an interesting addition to the list of local nesters and a reminder of the importance of the Mer Bleue and Alfred Bog as places of beauty and environmental significance.

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Christmas Bird Count Calendar

The Ottawa area Christmas Bird Counts will take place on the dates given below. Readers wishing to participate should contact the compiler well in advance of the date shown.

<i>Count</i>	<i>Date</i>	<i>Compiler</i>
Ottawa-Hull	December 16	Bernie Ladouceur (729-9471)
Pakenham-Arnprior	December 26	Michael Runtz (1-623-6975)
Carleton Place	December 29	Arnie Simpson (1-257-2963)
Dunrobin-Breckenridge	January 1	Bruce Di Labio (729-6267)

The Dunrobin-Breckenridge Christmas Bird Count

Bruce M. Di Labio

Over the years, three Christmas Bird Counts have been taking place in the Ottawa-Hull area: the Ottawa-Hull, Pakenham-Arn-prior and Carleton Place counts. In 1982, the Dunrobin Brecken-ridge count was added.

In the fall of 1981, Richard Poulin and I were discussing the possibility of a new area for a count within the Ottawa District's 50 km-radius circle because there was so much interesting area not being covered, and the manpower was available. We figured that the area west of Shirleys Bay was rich in bird life during the winter-time, and it was not in the areas of any of the other counts. After receiving authorization from the National Audubon Society in the United States to conduct a new published bird count*, it was full speed ahead.

Since we decided the count area would be Shirleys Bay and the area to the west of it, we needed a centre point for the 7½ mile radius bearing in mind that overlapping of count areas is not allowed. We picked the crossroads of Regional Road 9 and Kennedy Road (now called Thomas Dolan Parkway) at Dunrobin as the centre point, thus fitting nicely between the Ottawa-Hull and Pakenham-Arn-prior count circles.

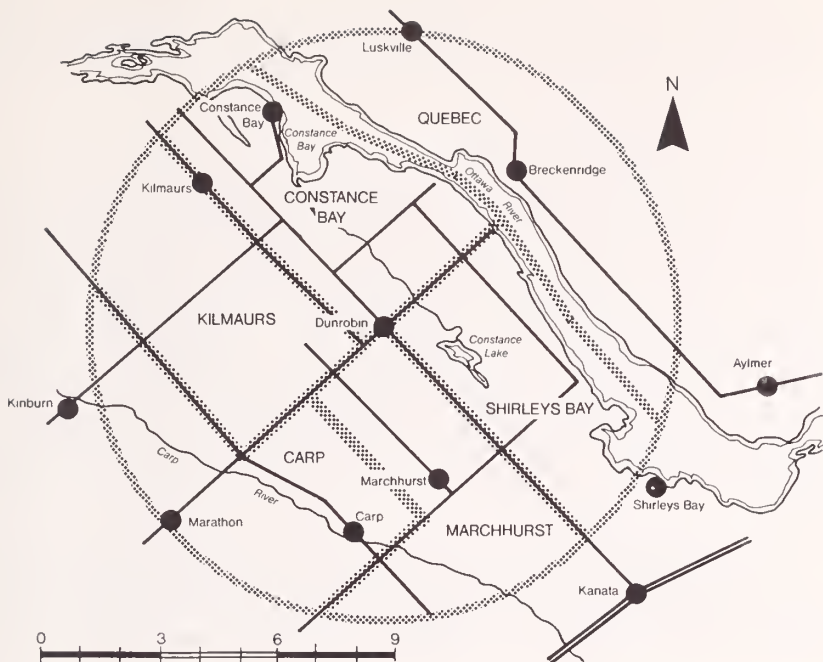
The next step was deciding on a date. The count period for 1981-1982 was December 19th to January 3rd. With the other counts already holding traditional dates, Dunrobin-Breckenridge had last pick. It would be the New Year count, held on the last Sunday of the count period so that there would be no conflict with the other area counts.

The count area was divided into six sections, and a leader was chosen for each area. Leaders and areas were as follows:

Carp - Richard Poulin	Kilmaurs - Ian Jones
Constance Bay - Tom Hanrahan	Shirleys Bay - Bruce Di Labio
Quebec - Jean & Rudolph Dubois	Marchhurst - Stephen O'Donnell

Each leader was assigned a number of participants, who then covered their respective areas.

** There are many counts that take place in North America that are not officially reported; therefore, much valuable information is not submitted to the National Audubon Society.*



The Dunrobin-Breckenridge Count Area

The Dunrobin-Breckenridge Count Area shown above is a 7½ mile-radius circle centred on the crossroads in Dunrobin. The habitat is primarily agricultural land with many isolated small woodlots. The Carp Ridge is a rocky area of higher ground covered with second-growth forest. The abandoned channel of the Ottawa River running from Constance Bay through Constance Creek and Mud Pond to Shirleys Bay is an area of varied habitat, rich in conifers, that provides cover and food for many overwintering species. The Ottawa River and its associated creek systems are mainly frozen during the count except for a few spots which can remain open during a mild winter. The circle includes a portion of the Quebec side of the river right at the edge of the Gatineau Escarpment. This area is also agricultural. A few small towns provide the only "urban" habitat.

On January 3, 1982, the count became a reality, and to the surprise of us all, a total of 52 species was recorded (Ladouceur and Di Labio 1982).

Since the first count, a total of 68 species has been recorded. (See table below.)

In summary, then, the Dunrobin-Breckenridge Christmas Bird Count takes place in an area of high diversity and relative stability of habitat in the rural environment. The results may provide interesting comparisons with the adjacent Ottawa-Hull Count, which is heavily urban and influenced by a high bird feeder concentration. In addition, the late date of the Dunrobin-Breckenridge Count makes this a truer winter count especially in comparison with the Ottawa-Hull Count, which takes place on the earliest Sunday in the allowed period. Information gathered on the Dunrobin-Breckenridge Count will provide base line data to help in the battle to preserve the unique features of this area.

I would like to thank Richard Poulin for helping me in the early stages of planning, and The Ottawa Field-Naturalists' Club for its support and for making this count a successful one over the last three years and we hope for many years to come.

DUNROBIN, ONTARIO - BRECKENRIDGE, QUEBEC CHRISTMAS BIRD COUNT

The following is a summary of record high counts for individual species recorded 1982-1984. The list is in the new A.O.U. order.

#	SPECIES	RECORD HIGH	YEAR	FIRST YEAR RECORDED
1.	Canada Goose	62	1983	1983
2.	American Black Duck	120	1982	1982
3.	Mallard	42	1982	1982
4.	Common Goldeneye	2	1983	1983
5.	Hooded Merganser	1	1984	1984
6.	Bald Eagle	1	1983	1983
7.	Sharp-shinned Hawk	2	1984	1982
8.	Cooper's Hawk	3	1984	1984
9.	Northern Goshawk	5	1982	1982
10.	Red-tailed Hawk	2	1982, 83	1982
11.	Rough-legged Hawk	16	1982	1982
12.	American Kestrel	13	1983	1982
13.	Gray Partridge	61	1984	1982
14.	Ruffed Grouse	39	1983	1982

#	SPECIES	RECORD HIGH	YEAR	1ST YR RCD
15.	Herring Gull	1	1983	1983
16.	Rock Dove	749	1983	1982
17.	Mourning Dove	15	1984	1982
18.	Great-horned Owl	24	1984	1982
19.	Snowy Owl	2	1983, 84	1982
20.	Northern Hawk-Owl	1	1982	1982
21.	Barred Owl	2	1982	1982
22.	Great Gray Owl	5	1984	1984
23.	Long-eared Owl	3	1982	1982
24.	Short-eared Owl	5	1982	1982
25.	Northern Saw-whet Owl	1	1983	1983
26.	Downy Woodpecker	89	1984	1982
27.	Hairy Woodpecker	134	1984	1982
28.	Three-toed Woodpecker	4	1983	1983
29.	Black-backed Woodpecker	4	1983	1982
30.	Northern Flicker	1	1982, 83	1982
31.	Pileated Woodpecker	15	1984	1982
32.	Horned Lark	85	1982	1982
33.	Gray Jay	1	1983	1983
34.	Blue Jay	325	1984	1982
35.	American Crow	119	1983	1982
36.	Common Raven	24	1983	1982
37.	Black-capped Chickadee	1,859	1983	1982
38.	Boreal Chickadee	4	1982	1982
39.	Red-breasted Nuthatch	63	1983	1982
40.	White-breasted Nuthatch	147	1983	1982
41.	Brown Creeper	38	1983	1982
42.	Golden-crowned Kinglet	71	1983	1982
43.	American Robin	3	1983	1983
44.	Bohemian Waxwing	146	1982	1982
45.	Northern Shrike	12	1984	1982
46.	European Starling	236	1983	1982
47.	Yellow-rumped Warbler	1	1983	1983

#	SPECIES	RECORD HIGH	YEAR	1ST YR RCD
48.	Northern Cardinal	2	1983	1982
49.	American Tree Sparrow	316	1983	1982
50.	Song Sparrow	2	1983	1983
51.	White-throated Sparrow	1	1983	1983
52.	Dark-eyed Junco	26	1983	1982
53.	Lapland Longspur	2	1982	1982
54.	Snow Bunting	3,161	1983	1982
55.	Red-winged Blackbird	1	1983	1983
56.	Eastern Meadowlark	1	1982	1982
57.	Common Grackle	2	1982	1982
58.	Brown-headed Cowbird	2	1982	1982
59.	Pine Grosbeak	251	1982	1982
60.	Purple Finch	149	1983	1983
61.	Red Crossbill	1	1982, 84	1982
62.	White-winged Crossbill	15	1982	1982
63.	Common Redpoll	701	1982	1982
64.	Hoary Redpoll	2	1982	1982
65.	Pine Siskin	17	1984	1982
66.	American Goldfinch	307	1984	1982
67.	Evening Grosbeak	963	1983	1982
68.	House Sparrow	1,104	1983	1982

Useful References

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Seven Years of Mammal-watching on Mount St. Patrick

Part III. Groundhog, Chipmunk, Squirrels, Beaver, Muskrat, Mice, Vole, Porcupine, Hare, Deer, Moose

Sheila C. Thomson

GROUNDHOG: Groundhogs inhabit the abandoned fields of the old mountaintop farms on Mount St. Patrick, but are not often encountered in the bush and bedrock country. The only noteworthy observations are of one Groundhog caught by a fox, and three different sightings of remarkably dark Groundhogs, with blackish-brown fur.

EASTERN CHIPMUNK: Chipmunks appear to be singularly lacking in fear of human beings. They go about their affairs around us, almost ignoring our presence, even though we have avoided taming or hand-feeding them.

Within the chipmunk community, some individuals are fiercely aggressive, while others, more timid, reluctantly submit to domination. Often a chipmunk will not permit another to share or even approach a discovered source of food. Even in July and August, when there is no shortage of natural food, we have witnessed savage fighting over a scattered handful of seeds. Once we watched a rather timid chipmunk, whose tail was partly missing, being attacked viciously by an aggressive individual each time that it ventured toward a seedpile. We decided to stop putting down seed in the summer in order to lessen stress within the chipmunk colony.

The Red Squirrels dominate the chipmunks, and chase them unceremoniously from the feeders. We have one record of a chipmunk attempting to bluff a Red Squirrel from a seedpile. The chipmunk made several dashes across the feeding area, each time making a false little lunge toward the squirrel as it passed. The squirrel completely ignored the chipmunk's antics.

On another occasion, however, we watched an evenly matched bluffing battle between a chipmunk and a Blue Jay. The chipmunk was able to drive the Blue Jay off by making sudden surprise rushes onto the feeder. The Blue Jay, in turn, could evict the chipmunk by swooping down on the feeder, wings and tail spread, in a threatening attitude.

We have only a brief note on one serious enemy of the chipmunk. One fall I witnessed part of a life and death chase be-

tween a weasel and a chipmunk. (See Weasel notes in Part II.)

Some time between mid-October and mid-November, depending on the weather, the Mount St. Patrick chipmunks disappear into their burrows and are not seen for four or five months. In the first mild days of March, they are out again scampering over the snow. We have one surprising record of chipmunk tracks in snow on December 9, 1978. Our only mid-winter chipmunk record, February 21, 1981, came in a freak winter that ended in the middle of February.

BLACK SQUIRREL: Mammalogists would call this "Gray Squirrel, black phase". We have not seen the gray phase on Mount St. Patrick.

Black Squirrels are scarce. We saw one in October of 1976, and then no more for two and a half years, when we had a single sighting in April of 1979. Two sightings in November of 1979 may possibly have been the same individual. Our next sighting in the cabin area was a year and a half later, June 29, 1981. For the rest of that summer and fall, we had occasional sightings of a single Black Squirrel near the cabin and at the feeders. On December 6, 1981, two Black Squirrels appeared at the feeders, and three on December 27. The three were regular visitors to the feeders for the rest of the winter and spring of 1982. Our last sighting of Black Squirrel was on August 2, 1982. We have seen none since. Only once, on October 5, 1980, did we see a Black Squirrel anywhere in the hills other than in the immediate vicinity of the cabin.

The Mount St. Patrick Black Squirrels are beautiful big glossy animals, very wild and shy. During the winter of 1981-82, when three were coming to the feeders, the slightest movement inside the cabin would send them leaping off into the bush, not to return again that day. Their surprisingly shy nature may account in part for our infrequent sightings of them.

RED SQUIRREL: Red Squirrels are, of course, common throughout the area. They are usually noisily vocal when a stranger, human or otherwise, invades their territory. Once, however, we watched a Red Squirrel that was perfectly silent, and somewhat apprehensive, as it investigated an intruder.

A little Northern Saw-whet Owl was discovered one morning roosting in our big pine tree, some distance out from the trunk on a branch. The Red Squirrel, curious but strangely cautious, hitched up the tree trunk, craning its neck and sniffing each time that it hesitated in its ascent. When it reached the owl's branch, it started cautiously along it, but soon shot back to the safety of the main trunk. Several times it started along the branch toward the owl, venturing closer and closer, in jerky

little spurts, before darting back to the trunk as fear overran curiosity. The owl must surely have been aware of the squirrel on its perching branch, but it gave no sign, other than to half open one eye now and then. Finally, the Red Squirrel's curiosity had taken it right out the branch to the sleeping owl, where it stretched forward, sniffing the owl. We held our breath, expecting a dramatic climax. None came. The squirrel streaked back to the tree trunk, descended to the ground, and proceeded to feed unconcernedly, apparently forgetting the owl, which continued to doze on a branch above it.

FLYING SQUIRREL: Flying Squirrels are common throughout the bush country of Mount St. Patrick. Although they are nocturnal, daytime evidence of their presence is to be found in summer by their tails (discards from weasel meals), and in winter by their snow tracks. A Flying Squirrel's tracks in snow may begin abruptly in the middle of an otherwise trackless pond or open space. In January of 1984, we measured with snowshoes an olympian glide, 50 m from landing mark on a pond to the closest likely launching spot, a tall spruce on the shoreline. The landing mark often shows a tail print or a short skid, and footprints will lead off to the nearest tree. The footprints tend to be more bunched up, less distinctly "four-footed" than a Red Squirrel's.

We have four records of seeing Flying Squirrels in daylight. In February of 1982, we came upon three young ones playing together in the branches of a big tree in broad daylight. On three occasions we have discovered Flying Squirrel nesting trees while making our way across beaver dams. In each case, a hole in a dead standing tree in a beaver dam produced a Flying Squirrel aroused by the disturbance on the dam.

Most winters, Flying Squirrels discover the bird feeders, and we are able to observe them at close range by lantern light or flashlight. Their movements are lightning quick, but they are not easily alarmed by human beings. They can be approached closely by flashlight at night, and even stroked, as they feed on suet or chick feed. Ours seem to be Southern Flying Squirrels, to judge by their very small size, beige backs and white underparts.

Four Flying Squirrels that were coming at night to the feeders in November and December of 1983, disappeared without a trace after December 11. We blamed a little saw-whet owl, which twice was seen to fly in at dusk and take up a hunting perch in a big White Pine just above the feeders.

BEAVER: Beavers are plentiful in the ponds and streams of the area, even though a number of trappers operate nearby. Beaver activity peaks each year in March-April when the Beavers are out

on the snowy streambanks cutting fresh saplings to replenish food supplies, and again in October-November when there is much cutting, dragging and storing of branches in the pond for winter food. We have one record of Beaver tracks for December (1978), and two for January (1978 and 1981). Only in 1982 were tracks seen in February. Occupied winter lodges have a frosted breathing hole near the top of the dome, and sometimes soft mewing sounds can be heard from within. Once a series of watery plunges indicated that several Beavers had dived for safety when Harry, a large and heavy predator, climbed onto a snowy lodge. Fox tracks often lead onto the winter lodges, but we have never seen evidence of digging.

In March, the Beavers become active, emerging through a diving hole kept open in the ice near the dam. When they are surprised on land in winter, their only recourse is to gallop clumsily over the snow and plunge through the diving hole. At this time of year they are easy prey, conspicuous against the white snow and easily cut off from escape. In March of 1981, we found the skeleton of a Beaver freshly dug up from the snow by a Timber Wolf. The Beaver had likely been caught and cached by the wolf earlier in the winter.

Late winter being a Beaver's most vulnerable season, we were astonished one March day in 1981 to come across Beaver tracks wandering in the snow several hundred metres from any pond or stream. The animal seemed to be on an overland trek to new terrain. We followed the trail for some distance through the bush to where it ended in a pond on a small stream. Had this Beaver been evicted from its home colony, or what had induced it to take such a long and dangerous overland journey? When is a Beaver colony full to overflowing? We have no way of knowing how many Beavers are in the colonies in our beaver ponds, five animals being the most we have seen at one time.

Considering the great numbers of Beavers active in most of our streams and ponds, it is remarkable how seldom they are observed actually engaged in cutting trees, building dams, or even feeding. One day in March of 1981, when the ponds were still partly sheeted in ice, we had a demonstration of Beaver technique in avoiding detection. When we surprised a Beaver feeding in a small pond, it dived under the ice and remained submerged for several minutes before surfacing cautiously. Then it floated motionless on the surface for a long time, camouflaged as a partly submerged log. When at last it felt safe, it resumed feeding on the small twigs stashed in the pond. It fed noisily, with loud chewing, smacking and tooth-chattering, cleaning the bark from each twig systematically, as one would eat the kernels from a cob of corn, and using both front paws to hold and rotate the twig as it worked its way along it. Getting wind of us, the Beaver took alarm again, and dived under the ice, where it remained minute after minute. Finally it surfaced very cautiously, scarcely rippling the water, and hung there

with only its eyes, the tip of its nose, and the crown of its head above the water. It was several more minutes before it relaxed this position and began swimming around, climbed out over a break in the dam, and disappeared into the top pond.

In a summer pond, the startling whap of a Beaver tail on the water is usually interpreted as a warning of the presence of an intruder, and no doubt it does sound an alert to the colony. We are convinced, however, that this tail-whapping behaviour is also employed deliberately to try to frighten off human intruders. We have often had a Beaver swim toward us and then repeatedly whap and dive, circling closer and closer to us each time that it slapped the water, in an apparent attempt to drive us away.

Beavers can be quite vocal. Sometimes several Beavers inside a lodge emit mooring and moaning sounds that are audible a hundred metres away. A local trapper taught us the trick of coaxing a Beaver to swim right up to us by imitating this mooring sound.

One fall I was a fascinated witness to a vocal exchange between two Beavers that met in a narrow swimming channel that had been opened through shell ice on the pond. The two Beavers stopped when they met, and spent some moments exchanging strange little Beaver sounds. Then each turned and swam purposefully back in the direction from which it had come. There was no indication of confrontation or dispute. The watcher had the impression that the two animals had communicated with each other in an intelligible and matter of fact way. In the same beaver pond, we watched a big Beaver using its teeth to cut another swimming channel through thick ice.

The legendary industry and persistence of Beavers is not over-rated. We are glad to make use of a byproduct of their industry. All summer the Beavers fell trees, chew off and drag away the branches and slash, and leave the main trunks trimmed and ready to be cut in lengths and hauled to the cabin for firewood in the fall. Our beaver-cut firewood is by no means confined to poplar and White Birch. It includes Sugar Maple, Yellow Birch, Beech and even Ironwood, all excellent hardwoods. On the subject of persistence, we have photos of one beaver-cut tree, hung up by the crown in neighbouring trees, with seven cuts through the butt of the tree by a Beaver unwilling to give up.

MUSKRAT: Muskrats inhabit some of the ponds and marshes of the area. Ten sightings are recorded, all mere glimpses of Muskrats swimming or diving from sight. One Muskrat route between two adjacent beaver ponds is so well used as to be a beaten trail, summer and winter. We have counted 16 Muskrat mounds on one of

our beaver ponds. In March of 1983, we recorded Fisher tracks going from mound to mound, with only one mound torn open by the Fisher, however. Once we found evidence in the snow that a wolf had caught a Muskrat in a marshy ravine, apparently digging in the snow for it, as there were no Muskrat tracks on the surface.

DEERMOUSE/WHITE-FOOTED MOUSE: Not being aware that the White-footed Mouse, a close relative of the Deermouse, can come as far north as our area, we assumed that all of these observations referred to the Deermouse. Since it is possible that both species may be involved, we shall use the term *Peromyscus* mice, which includes both White-footed Mice and Deermice.

These pretty little mice are active all year round. We have records for every month except July and August. Many of the records are from snow tracks. The tracks of *Peromyscus* mice are miniscule but unmistakable, resembling a hare print in general pattern. Often they are the only snow prints to be found during particularly cold weather when most winter mammals tend to stay under cover. (Red Squirrels and the predators are the other exceptions.) On January 2, 1981, when the temperature dropped to a dangerous -40 degrees C, and we human beings dared not venture far from the cabin, there were numerous tracks of *Peromyscus* mice leading over the snow from tree base to tree base!

Peromyscus mice are nocturnal. With one exception, our eight actual sightings have been at night by firelight, lantern light or flashlight. Once in the beam of a flashlight we traced movement high up in a big pine tree to one of these tiny mice, a minute creature, all the more minute in such a setting on a black night under a big sky.

In April of 1983, I saw my first gray *Peromyscus* mouse. Harry had just felled a big dead Beech tree. A full minute after the tree fell, a little gray *Peromyscus* mouse emerged from the stump and made its way to the shelter of a beaver dam. After five more ear-shattering cuts of the chainsaw through the big Beech, a second bewildered little gray mouse came out of the tree trunk and headed for the tangle of vegetation on the beaver dam.

We were delighted one fall day to come upon a minute food cache, which we attributed to a Deermouse, although it may have been a White-footed Mouse. An abandoned songbird nest, about knee-high above the ground in shrubbery, contained a tidy little pile of Basswood "monkeynut" seeds, the wings all carefully removed. The monkeynuts that were lying on the ground below the nearby Basswood tree each had a tiny hole gnawed through the hard shell, and the central nutlet was gone.

GAPPER'S RED-BACKED VOLE: Red-backed Voles are not uncommon in our rocky bush country. They seem to live together in families, or perhaps small colonies. Sometimes two or three are seen together under the juniper shrubbery that covers bedrock outcroppings.

They are often out scampering over the snow in winter. Their snow tracks are wider than those of the small shrews, the straddle being at least two and a half centimetres and sometimes approaching three and a half centimetres broad. Usually there is a double pawprint, somewhat as in the weasel family, but with leaps scarcely ever exceeding 10 cm. All four pawprints may at times register, but never in the "snowshoe hare pattern" of the Deer mouse family. Sometimes a tail drag shows.

Although Red-backed Voles are seen all winter, they do store food in the fall. In October, 1981, and again in October, 1982, we watched Red-backed Voles making trip after trip, carrying sunflower seeds one or two at a time from seedpile to stockpile in a ground burrow.

Most falls, Red-backed Voles discover the seeds dropped beneath the freshly filled bird feeders, and we watch them out feeding on the snow surface, conspicuous prey for lurking weasel or owl. Some do fall victim. In the spring of 1982, when examining the contents of an owl pellet, we found a minute skull. Using Burt and Grossenheider's *Field Guide to the Mammals*, we matched it with that of a Red-backed Vole.

We have noticed that the Red-backed Voles at the feeders grow progressively more cautious as the season advances. (Or maybe it is the more cautious individuals which survive as the season progresses.) On November 28, 1981, we noticed a Northern Shrike down on the ground at the entrance to a vole burrow. It left without making a catch. For about a month, the shrike remained in the area, sometimes perching in a pine above the feeders for half an hour at a time. We never saw it catch anything.

One little vole, grown cautious, would sit for some seconds in the entrance to its burrow, only its nose visible, before making a lightning dash for seed and darting back into its burrow to eat it. We began to place seed for the voles in the protected crevices of the woodpile. In 1983, we made a protective brush pile for them. In both places, much of the seed intended for the voles was carried off by Red Squirrels.

As with the chipmunks, the Flying Squirrels, and perhaps even the winter birds, a regular source of food for the voles proves a mixed blessing. It sometimes provides a regular source of prey for predators. We recognize when we put out winter feeders that it is for our own pleasure. Nature does not need our assistance. We wonder just how seriously we are interfering

with a balanced ecosystem. Probably the predators who benefit from a feeding station are more likely to go hungry in winter than are the birds or small mammals we unwittingly entice to the feeders. Still, it is disturbing to have to acknowledge that we have enticed some wild creatures to their death.

PORCUPINE: A vague impression that Porcupines have steadily declined in numbers over the past seven years is not exactly borne out by the records. Thirteen Porcupine records for 1977 and again for 1978, dropped to six records each for 1979 and 1980, and then bounced back up to eleven records each for 1981 and 1982. In 1983, there were only five Porcupine records for the entire year.

For Porcupine predators, see the notes on Fisher in Part II. Man also takes a toll, inadvertently in road kills, and deliberately when property is being damaged by a gnawing Porcupine. We know of one instance in our area where an astonishing number of Porcupines were wiped out by a determined individual in the name of self defence. (We have learned to protect ourselves against Porcupines, using sheet metal, angle iron and creosote.)

Porcupines are not strictly herbivores. In addition to eating the bark of hemlock, pine, juniper, Paper Birch, and a host of other trees, and, of course, plywood, lumber and highway guardrail posts, the Mount St. Patrick Porcupines are known to eat tires and the casing on ignition wires. They also eat aluminum! Incredible as it sounds, the evidence is that in the spring of 1977 a Porcupine actually consumed hand-sized patches of aluminum sheeting on our makeshift cabin. No scraps, splinters or fragments of metal were found anywhere near the damaged aluminum walls. (Corroborating this observation, a neighbour 20 km through the bush to the west of us keeps on exhibit what is left of an aluminum boat "eaten, not just chewed" by Porcupines. I have to believe him.)

Porcupines under the cabin at night make their presence known by a loud rhythmic penetrating gnawing. Voiced sounds I have described variously as mewling, moaning and whining. Once we traced a loud squawking cry in the night to a solitary Porcupine.

We have found Porcupine dens in caves, rockpile crevices, the hollow bases of standing Basswoods and Yellow Birch trees, and in the tumbledown ruins of an old log house.

Young Porcupines are out wandering around in April and May. In April of 1981 we found a tiny Porcupine on the ground, and Harry tried to get photographs. The mother Porcupine hitched herself clumsily up a big oak tree, making no effort to defend her young. Indeed, she showed no outward signs of dis-

tress but seemed impassive as we persuaded the young one into position for a picture. The baby Porcupine seemed to lack the instinct - or perhaps the ability - to climb to safety. However, it did instinctively hide its head and lash out bravely with a small quilled tail. Perhaps this is all the protection that it needs.

Our biggest Porcupine surprise came one day as we paddled silently along a winding stream. Rounding a curve, we saw in mid stream the rusty head of a large animal swimming across the stream, which at that point was about 10 m wide, and swift-flowing. It took us several seconds to identify the swimmer as a big Porcupine. It seemed to have taken to the water of its own free choice. When it reached shore, it clambered out and waddled up the bank to climb a tree. It appeared to us that it was much less awkward in water than on land. It helped to explain the Porcupine that we once saw on a piece of floating driftwood in the Madawaska River!

SNOWSHOE HARE: Hare tracks were recorded as being common to numerous during the winter of 1977, and abundant everywhere during the winter of 1978. On February 5, 1978, I wrote that the cabin clearing was completely trampled by hares. There were still many hare tracks in December of 1978. A year later, on December 2, 1979, I recorded some, but not many, hare tracks. During the winters of 1980 and 1981, hares were noticeably down in numbers. By the winters of 1982 and 1983, there were some tracks in the open bush country, but they were not numerous. Hare colonies seemed to be keeping to the sheltered evergreen areas. By December of 1983, we were recording hares as not uncommon in sheltered areas of the bush.

During the peak winters of 1977 and 1978, we had several records of hare kills by fox, and one kill by a Fisher. One mysterious kill we found at 5 a.m. on May 16, 1982 (on the Club's Dawn Chorus outing) when we discovered a completely headless full-grown hare beside the cabin lane. What nocturnal predator could sever the head from a big Snowshoe Hare?

Sometimes we were entertained by the frolicking antics of hares. In May of 1978 we watched several hares darting and chasing crazily around the cabin clearing. In the midst of the chase, two hares met, nose to nose. For some seconds they crouched motionless, almost touching noses. Then, as if activated by an electric switch, one hare shot straight up into the air. At the same instant the other hare shot forward, passing beneath the hare in the air, and the wild careering continued.

In March of 1979, the year that hare numbers dropped off, we witnessed a group of hares on the move in Renfrew County Forest. At intervals of a second or two, we counted ten hares leaping across the lane that curves through the pine plantation,

cutting snow white arcs against the dark green of the pines. More may have been crossing just out of sight around a curve in the lane. We were left to speculate on the meaning of this movement. An unseen predator? A stampede started by a skittish individual? A migration? Frolicking hares usually take an erratic course.

Interested in the phenomenon of seasonal colour change, we kept notes on the pelage of spring and fall hares. Our hares change from gray-brown to white in November, and are very conspicuous against bare ground in years when there is no snow in November. The spring change of pelage from white to grizzled brown may begin in March, when some hares are already a dingy white, but it is not complete until May. April hares vary from white to milky grayish-beige. Some hares are still white in mid-May.

On March 5, 1983, we were amazed to come upon a jet black hare, conspicuous to predators as it sped away over the snow. How had such an individual survived the winter? The black hare was seen on five different occasions from March 5 to April 23. It had a favourite daytime resting place in a brush pile beneath some evergreens. When we approached it too closely, for photographs or a better view, it would dart out from its hiding place and go leaping away over the snow. We did not see it again after its daytime resting place became flooded with meltwater.

WHITE-TAILED DEER: Deer are now common on Mount St. Patrick. In the past three years, with doe-hunting restrictions in force, we have recorded a total of 18 sightings, compared with a total of five sightings for the preceding four years.

When the deep snow of winter arrives, deer tend to congregate in small herds in areas of thick evergreen bush. We have come upon at least four deer-wintering areas when exploring new terrain on skis. How large are the winter herds? The tracks of several animals, accumulating within a restricted area over a period of many winter weeks, may give the impression of a much larger herd of animals than is actually present. When the winter is not too severe, or the snow not too deep, deer may wander in their summer terrain for much of the winter. In December of 1981, we noted where a herd numbering seven deer had, on more than one night, bedded down in the high open woods of bedrock country. The seven deer couches were in each case all within 20 m of one another.

In winter, deer sometimes follow along on ski tracks or snowmobile trails, where they sink less deeply in the snow. We were surprised, therefore, in April of 1979 to record unusually wary behaviour in a deer whose footprints indicated that it was afraid to cross our ski track - a mere 20 cm wide trough in the fresh snow. Three times the deer stopped abruptly when about to

cross the ski track, and looped back through the bush to come out further along our route, where the same unwillingness to step across the trail was exhibited.

In April of 1978, we found evidence of wolf predation. We came upon the body of a deer that had been killed by a wolf some time during the previous week, and most of the meat had already been eaten. Two weeks later, the deer kill was completely gone except for the pelvis bone and a couple of vertebrae. It is astonishing how a carcass the size of a deer can vanish within a matter of days.

MOOSE: Our only moose sighting was on November 25, 1979, when a moose came up onto the county road in front of the car, ran ahead of the car for a hundred metres or so at about 60 km an hour, and entered the bush on the opposite side of the road. ▀

Handbook of Canadian Mammals

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Oatgrasses

The Genus *Danthonia* in the Ottawa District

Stephen J. Darbyshire

drawings by B.S. Brookes and I.A. MacLatchy

Only two species of the cosmopolitan oatgrasses (*Danthonia*) occur in the Ottawa District. In other parts of the world, oatgrasses are more common, more diverse, and even highly economically important. Poverty Oatgrass (*Danthonia spicata* (L.) Beauv.) is a widespread species in North America and is very common in our area as fig. 1 indicates. Compressed Oatgrass (*Danthonia compressa* Aiton) is more restricted in range, occurring from Tennessee and North Carolina north to Nova Scotia, southern Quebec and central Ontario. It has been collected in our area only along the Gatineau River (fig. 2) and is considered rare in Ontario (Argus and White 1977) and in our area (Gillett and White 1978). A number of recent collections of *D. compressa* from Ontario, primarily in the Algonquin Park area, indicate that this grass is more widespread in the province than previously thought (fig. 3; Dore and McNeill 1980).

The two species are similar in their densely tufted, perennial habit, without stolons or rhizomes. Dead leaves from previous growth tend to add to the tufted appearance. The plants may grow as isolated tufts or as thick mats with the individual tufts being indistinguishable (Dore 1959). The leaves are composed of two parts, the distal, flat blade which is free of the stem (culm), and a sheath, which is the proximal portion of the leaf that wraps around the culm (fig. 4).

The flower structure of grasses is not easy to interpret for the uninitiated. It is also difficult to examine the small floral parts without a microscope or lens that allows one to use both hands for dissection. The two bracts that enclose the reproductive parts (stamens and pistil) are called the palea (the adjacent bract) and the lemma (figs. 5 and 6). (This latter bract partially encloses the palea forming a complete enclosure with the palea around the reproductive parts.) Together with the reproductive parts, the palea and lemma make up a structure more or less equivalent to a single flower.

The flowers of grasses are referred to as florets, a term which alludes to their reduced structure. Each floret produces a single grain or seed called a caryopsis. In the oatgrasses, as with many grasses, several florets are grouped together, alternating along a short stem (the rachilla), and all of which are more or less enclosed by two larger bracts called glumes. The glumes protect the group of florets during development. They obscure the florets so that the whole series of bracts and re-

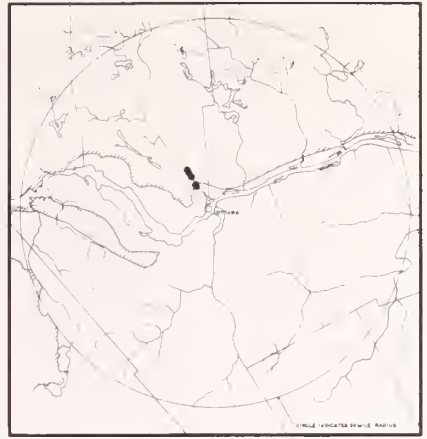
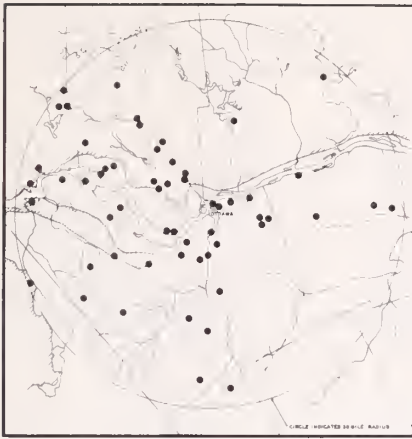


Fig. 1. (left) Distribution of *Danthonia spicata* in the Ottawa District adapted from Dore (1959). It is abundant throughout the District, and the lack of indicated sites, especially in the east, is a result of limited field work rather than limited occurrence. Hatched areas indicate the edges of the Canadian Shield. Fig. 2. (right) Distribution of *Danthonia spicata* in the Ottawa District.



Fig. 3. Distribution of *Danthonia compressa* in the Ottawa District.

reproductive parts appear to the unaided eye as a discrete unit. This unit is called the spikelet. The branch supporting a single spikelet is called a pedicel. Our oatgrasses usually have 8 to 12 spikelets on the branches of a flowering stem (inflorescence).

In most populations the floral bracts spread open and the reproductive parts (stigmas and anthers) are exerted at flowering time (anthesis) exposing them to wind currents. After fertilization of the ovary, the bracts close again to protect the developing caryopsis. Some populations of Poverty Oatgrass have been diagnosed as being completely self-fertilizing (apomictic), and in these plants the floral bracts remain closed throughout development (W.G. Dore pers. comm.).

As well as the visible flowers described above, *Danthonia spicata* and *D. compressa* produce cryptic flowers at the bottom of the sheaths of the lower culm leaves. These highly modified spikelets produce a large caryopsis in one or more large, apomictic florets called cleistogenes. This represents a very different reproductive strategy from the typical grain production (Clay 1983b). Since the cleistogenes are always self-fertilizing, they have exactly the same chromosomes as the plant on which they develop. In some populations of *D. compressa*, the cleistogenes may represent one-half of the total seed count (Clay 1983a). The percentage of cleistogenes produced varies with genetic background as well as environmental conditions (Clay 1982, Clay 1983a). The cleistogenes are distributed when the stem dies and breaks apart at the nodes. The old stems shatter easily although the sheath remains attached to the stem protecting the enclosed cleistogene(s). The lemmas of the cleistogenes do not have the long, wiry apical projection (the awn) present on the other "aerial" lemmas.

Danthonia spicata (L.) Beauv.

Poverty Oatgrass is abundant throughout much of Ontario and Quebec. It does very well in sandy soils and thin, dry soils over granitic or sedimentary rock outcrops. In open habitats where it is most abundant, the soils are often prone to severe frost heaving in the spring followed by very dry periods in the summer. This grass has undoubtedly become more common in Canada through man's clearing of forests and poor agricultural practices.

The foliage, both sheath and blade, may be covered in long hairs 2-4 mm long, although it is sometimes hairless (glabrous) except for a few hairs near the junction of the sheath and blade. The ligule is a fringe of stiff hairs in a row at the junction of the leaf sheath and blade adjacent to the stem (fig. 4).

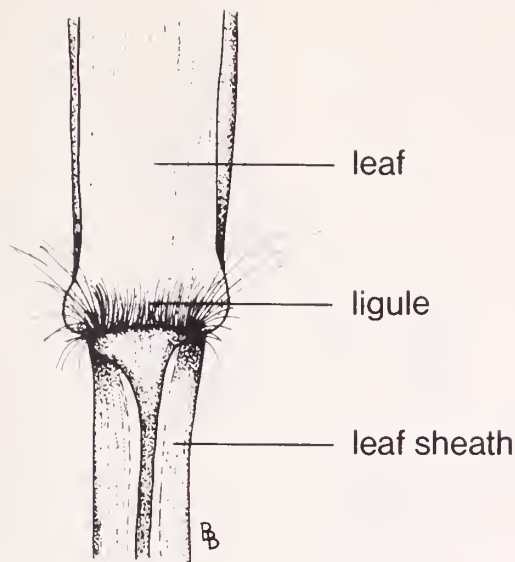


Fig. 4. The junction of the leaf blade and leaf sheath of *Danthonia compressa*, showing the ligule of hairs and the lateral tufts of hairs.

As the short leaves die, they curl in an almost complete circle about 3-4 cm in diameter. The tufts of curled leaves are present in all seasons, although most evident during dry periods, and make this grass one of the most distinctive and easily recognized species in the field.

The inflorescence of *Danthonia spicata* is, as the name implies, like a spike. The short branches are held erect and close to the main axis of the stem. At the base of each branch is an organ, the pulvinus, which through water turgor allows the branches to be spread and held at right angles to the main stem at anthesis. All the florets in the inflorescence are at anthesis at the same time, and the branches are spread at their maximum for only a day. After this, most of the pollen has been shed, the ovaries have been fertilized, and the branches begin to close up again.

Danthonia compressa Aiton

Compressed Oatgrass has been found in the Ottawa District in woods with shallow soils along the lower Gatineau River. At sites in Ontario outside the Ottawa District, it is found on acidic, sandy soils at the edges of openings in forests and along roads, trails and portages through woods. Further to the east in Quebec and the Maritime Provinces, it can be found as a dominant in open sandy areas and pastures. Dr. Dore has suggested that it may not be native to western Quebec and Ontario. He speculates its presence may be due to human introduction

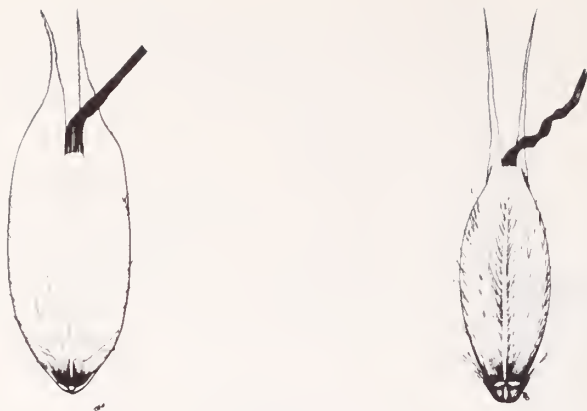


Fig. 5. (left) The lemma of *Danthonia spicata*. Note the length of the two apical "teeth" relative to the rest of the lemma. The long, twisted awn is not entirely shown. The hairiness of the lemma is highly variable, and the difference between this lemma and the one in fig. 6 is not significant. This lemma is also younger and less indurate than that in fig. 6. Fig. 6. (right) Lemma of *Danthonia compressa*. Again note the relative length of apical teeth. The awn is not fully illustrated.

along rivers and portages during the great logging era of Ontario (Dore and McNeill 1980).

The leaves of Compressed Oatgrass are more or less glabrous except for the ligule and two small but conspicuous tufts of hairs at the junction of the leaf blade and sheath (fig. 4). The leaves do not form tufts of curls when they die but remain flat or become twisted when dry. The flowering stems usually have very conspicuous patches of red pigment at the lower nodes. Although sometimes present in luxuriant *Danthonia spicata*, the red pigments are never as intense or obvious as in *D. compressa*.

The inflorescence branches of this species do not "close-up" after anthesis but remain widely spread from the main axis as the caryopsis ripens. The branches are much longer in this species than in *Danthonia spicata* (table 1, figs. 7 and 8). At the lower nodes of the inflorescence at the base of the branches, and sometimes on the nodes of the branches, are one to several thin membranous scales (figs. 8 and 9). These delicate structures are deciduous and are readily broken in handling; they are best observed in the youngest inflorescences. They are supported on a regular or irregular ridge of stiffer tissue that partially or completely encircles the stem. The ridge may have a pronounced, broadly-rounded projection. An apical fringe of hairs may be present on the ridge of tissue, or there may be only a few scattered hairs. These structures may represent vestigial leaf development at the inflorescence nodes.



Fig. 7. The lower branches of inflorescence of *Danthonia spicata*. Note the length of the pedicels relative to the length of the spikelets. The branches have been mechanically spread to show this feature.



Fig. 8. The inflorescence of *Danthonia compressa*. Note the length of the pedicels of the lowest branch relative to the length of the spikelets. The pulvinus is not readily visible, but at the lowest node two membranous scales can be seen.

Table 1 Comparison of *Danthonia spicata* and *D. compressa*

<u>Character</u>	<u><i>Danthonia spicata</i></u>	<u><i>Danthonia compressa</i></u>
habitat	open areas, often in poor soils	in the Ottawa Valley found in openings in forests
leaf blades	shorter, to 15 cm long; strongly curled when dry	longer, usually more than 15 cm; not strongly curled when dry
leaf blade and sheath hairiness	glabrous to densely pubescent	glabrous except for the few long hairs in a tuft at the blade-sheath junction
panicle branches	erect and adpressed after anthesis; lower branches bearing a varied number of spikelets; all branches are more or less the same length or slightly decreasing toward the top	remaining spreading after anthesis; lower branches usually with 2 spikelets and rarely more than one branch per node; branches very conspicuously reduced in length toward the apex
spikelet pedicels of lowest inflorescence branches	pedicels of spikelets shorter than to only slightly longer than the spikelet	at least one spikelet on a pedicel much longer than the spikelet
lemma	apical teeth of lemma to 2 mm long, shorter than the length of the body of the lemma	long narrow teeth 2 mm or more in length, about the same length as the body of the lemma
scales of the inflorescence	scales absent	deciduous, membranous scales at the lower inflorescence nodes.



Fig. 9. The membranous scales of the lower inflorescence nodes of *Danthonia compressa*. There is a great deal of variation in the number and size of these scales. Several young inflorescences should be examined in order to be sure of seeing these structures clearly.

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Fig. 10. *Danthonia spicata*. Note the "closed" inflorescence with short branches and the short leaves that curl on drying.



Fig. 11. *Danthonia compressa*. Note the "open" inflorescence with long branches and the longer leaves. Dead leaves will sometimes tend to curl if the plant is growing in a very dry site, but they rarely form the tufts of curls so distinctive in *Danthonia spicata*. ▢

Water Babies

Larval Fishes of Ottawa and Vicinity

Part III. Larval Fishes of Shallow Water Species

Daniel J. Faber
National Museum of Natural Sciences
Ottawa

Larval fishes can often be observed in shallow water while walking along shores of rivers or lakes or in deep water just below the surface while rowing or slowly motoring a boat. In order to see baby fish alive, one needs to be alert and observant for they are tiny and possess very little colour. However, after a little experience one can learn to recognize a number of species of larval fish even without taking them out of the water. This third of a series of four articles* describes and illustrates several shallow water species of larval fishes living in the Ottawa area. The fourth article will illustrate species that live in deep water.

The actual identification of larval fishes is based upon various biological features: 1) body shape and other anatomical structures, 2) patterns of pigmentation, 3) countable structures (for example, finrays), and 4) transient larval characters. Environmental information, such as time of year, temperature of water, and habitat where they live, is helpful. Persons identifying live specimens should be aware that live specimens show behavioural features in addition to anatomical features. Several things can be observed: whether or not they school together, whether they have dark or light body pigmentation, whether they swim at the surface or deeper in the water, how they swim (stiffly or wiggly), and whether they live in shallow beaver ponds, deep lakes, or rivers. When viewed alive and enlarged, larval fish are quite spectacular with their transparent tissues, organs and blood contrasted with their black eyes and black and brown pigment cells.

Near Ottawa one can readily see the larvae of Sticklebacks, Fathead Minnows and Redbelly Dace in shallow beaver ponds (for example, the pond at Sarsaparilla Nature Trail on Richmond Road or Mud Lake in Gattineau Park). The slow backwaters of the Ottawa River are good places to observe schools of Golden Shiners, White Suckers and Bullheads. A field study in nearby Devil

* *Part I. Distribution and Phenology of Baby Fishes in Lakes and Ponds. Trail & Landscape 18(2): 84-92 (1984);*
Part II. Anatomy of Larval Fishes. Trail & Landscape 18(4): 198 - 204 (1984).

Table 1. List of Shallow Water Larval Fishes Described

<i>Family</i>	<i>Species</i>	<i>Common Names (English, French)</i>
Atherinidae	<i>L. sicculus</i> (Cope)*	Brook Silverside, Crayon d' argent (fig. 2A.)
Catostomidae	<i>C. commersoni</i> (Lacépède)	White Sucker, Meunier noir (fig. 2B)
Centrarchidae	<i>A. rupestris</i> (Rafinesque)	Rockbass, Crapet de roche (fig. 1D)
	<i>M. dolomieu</i> (Lacépède)	Smallmouth Bass, Achigan à petite bouche (fig. 1B)
	<i>P. nigromaculatus</i> (Le Sueur)	Black Crappie, Marigane noire (fig. 4A)
Cyprinidae	<i>C. eos</i> (Cope)	Northern Redbelly Dace, Ventre rouge du nord (fig. 3B)
	<i>C. carpio</i> L.	Carp, Carpe (fig. 3C)
	<i>N. crysoleucas</i> (Mitchill)	Golden Shiner, Chatte de l'est (fig. 2C)
	<i>N. cornutus</i> (Mitchill)	Common Shiner, Méné à nageoires rouges (fig. 2D)
	<i>P. notatus</i> (Rafinesque)	Bluntnose Minnow, Ventre-pourri (fig. 4B)
Cyprinodontidae	<i>P. promelas</i> (Rafinesque)	Fathead Minnow, Tête-de-boule (fig. 2E, 2F)
	<i>F. diphanus</i> (Le Sueur)	Banded Killifish, Fondule barré (fig. 4C)
Esocidae	<i>E. lucius</i> L.	Northern Pike, Grand brochet (fig. 3A)
Casterosteidae	<i>C. inconstans</i> (Kirtland)	Brook Stickleback, Epinoche à cinq épines (fig. 1C)
Ichthaluridae	<i>I. nebulosus</i> (Le Sueur)	Brown Bullhead, Barbotte brune (fig. 1A)
Percidae	<i>E. exile</i> (Girard)*	Iowa Darter, Dard à ventre jaune (fig. 4D)

* Commonly found in both shallow water and deep water habitats.

Lake has demonstrated how young Lake Trout can be collected during active emergence from spawning gravels (Boraski and MacLean 1981). (Special collection methods are required for species that live on the bottom of deep lakes.)

The pigments which give larval fishes their characteristic black or brown patterns are melanins, which are naturally-occurring polymerized organic compounds. Melanins are usually found in special animal cells called melanophores. Biologists have devoted more attention to melanophores than to any other pigment cells, yet some of the fundamental characteristics of melanophores are still a mystery. It is known, for example, that all melanophores are not uniform in shape, biochemical composition or even physiological reaction. (Melanin granules disperse or congregate within melanophores in response to nervous, hormonal or environmental stimuli.) In fact, it is suspected that all melanophores do not even contain true melanins.

Other animal colours found on living larval fishes include reds, yellows, blues and whites. Only one species in the Ottawa region, the Banded Killifish, is coloured with white pigment in special white cells (guanophores) in addition to the ever-present melanophores. When viewed alive, Banded Killifish larvae look as if they are covered with spots of fungus.

Study of the identification of freshwater larval fishes in the Great Lakes region started on Lake Erie with an oceanographic-type survey. Marie Poland Fish completed this work (Fish 1932) with her husband, Dr. Charles Fish, who was at that time Director of the Buffalo Museum of Science. Marie Fish was both an artist and biologist, for many of her illustrations of larval fishes are still valid today. A recent compilation of the literature on the early life of Great Lakes fishes was recently published (Auer 1982) and takes over as the definitive guidebook from the famous study on Lake Erie.

Descriptions of larval fishes from Ottawa and vicinity are presented on the basis of two habitats. The baby fishes discussed here normally live in shallow water, either along shores or within weeds. These 16 species are represented by the early life of the Brown Bullhead as described in Part I. Several species living in deep water will be described in the next article (Part IV).

Table 1 lists the species illustrated and described in this article. They are arranged alphabetically by family. Both English and French common names are included with their scientific names. These larvae have been illustrated in four figures which show similarities among patterns of pigmentation. Figure 1 shows four species possessing a type of pigmentation which consists of melanophores scattered diffusely over the entire body, fig. 2 shows five species possessing lines of melanophores along their back and a mid-lateral line, fig. 3 shows three

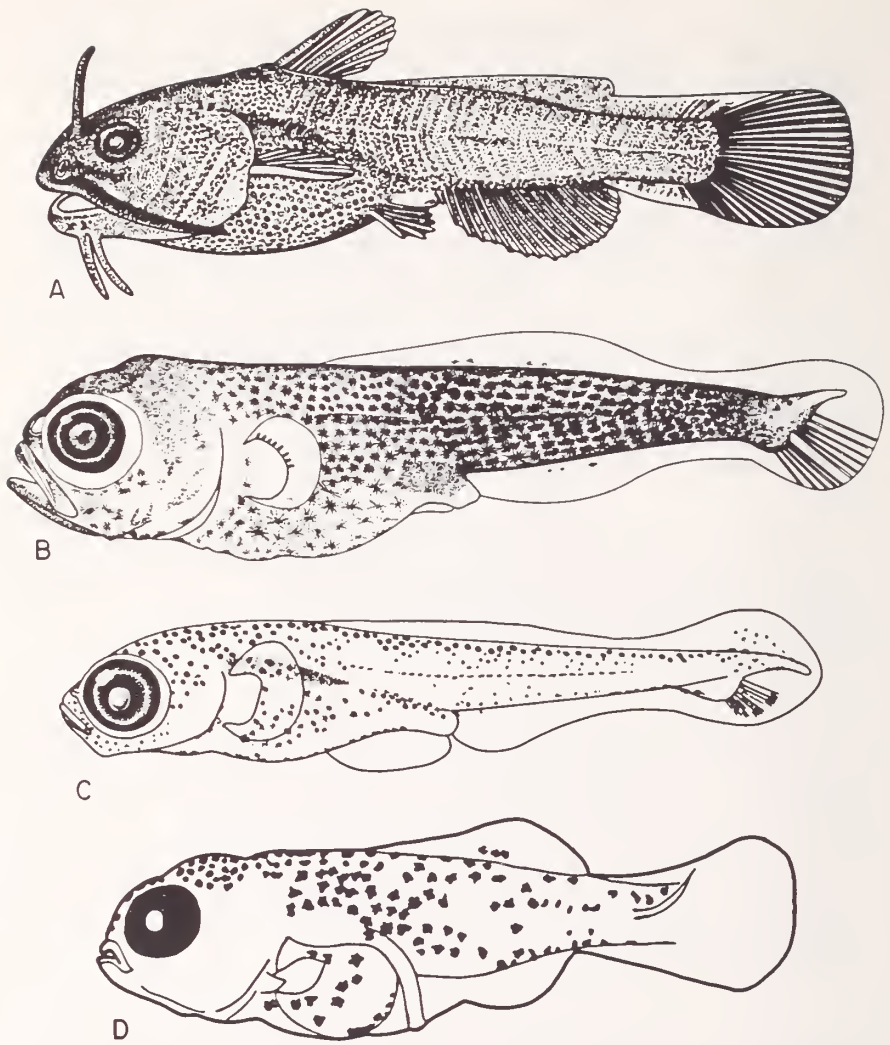


Fig. 1. Four larval fishes possessing a type of pigmentation which consists of melanophores scattered diffusely over the entire body. A. Lateral view of Brown Bullhead, 18.0 mm, B. Lateral view of Smallmouth Bass, 9.9 mm, C. Lateral view of Brook Stickleback, 8.0 mm, D. Lateral view of Rockbass, 8.6 mm. (Illustrations A, B and C by Sally Gadd, D modified from Buynak and Mohr Jr. 1979.)

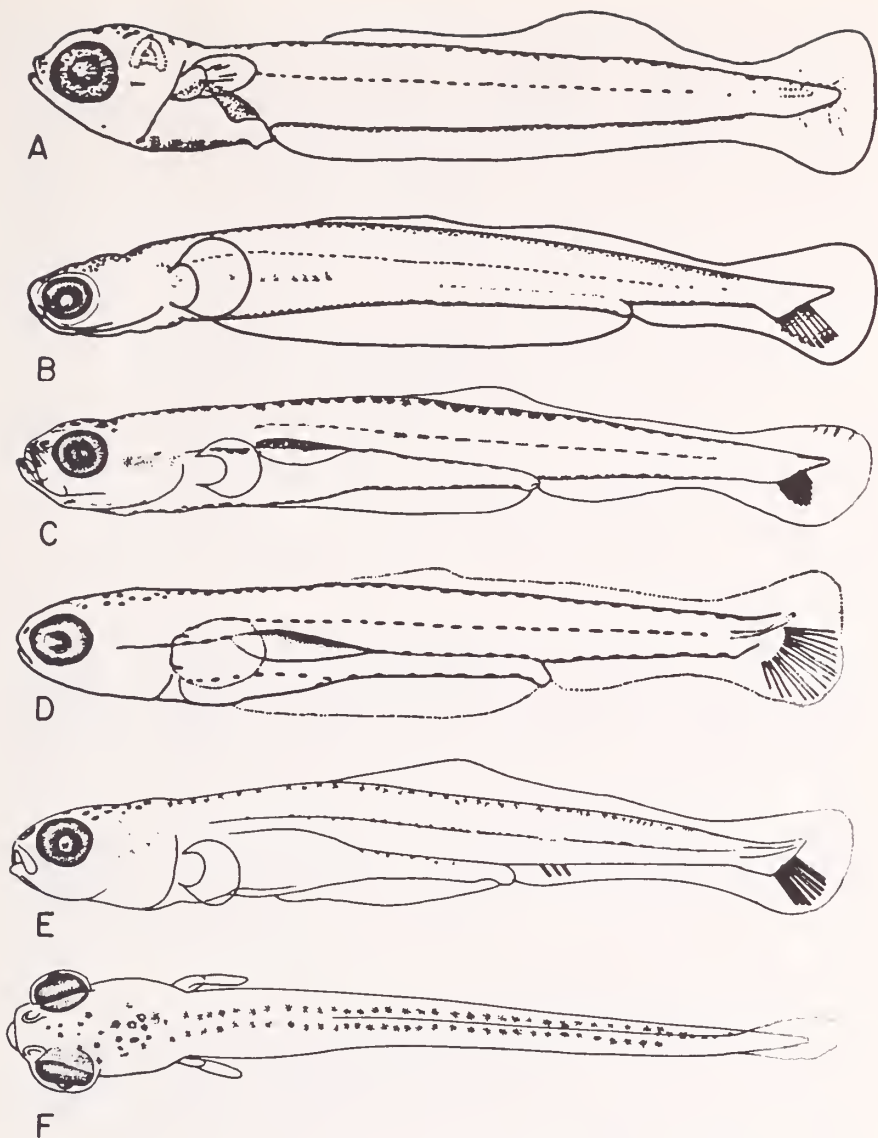


Fig. 2. Five larval fishes possessing a type of pigmentation which consists of lines of melanophores along their back and a mid-lateral line.

- A. Lateral view of Brook Silverside, 7.3 mm (modified from Rassmussen 1980),
- B. Lateral view of White Sucker, 13.8 mm (from Cucin and Faber 1984),
- C. Lateral view of Golden Shiner, 8.0 mm (by Sally Gadd),
- D. Lateral view of Common Shiner, 8.4 mm (modified from Heufelder and Fuiman 1982),
- E. Lateral view of Fathead Minnow, 7.9 mm (by Sally Gadd),
- F. Dorsal view of Fathead Minnow, 7.9 mm (by Sally Gadd).

species possessing scattered melanophores along their back and lacking a distinct mid-lateral line, and fig. 4 shows four species which lack melanophores along their back. A key to their identification was not constructed because each species changes morphologically from day to day; thus several keys are necessary to identify effectively every stage. In addition, all species are not available in collections to create such a key accurately. It should be remembered that certain larval fishes are still impossible to identify because no one has documented their morphological features.

DESCRIPTIVE ACCOUNTS OF SHALLOW WATER SPECIES

Brook Silverside (*Labidesthes sicculus*) Crayon d'argent (fig. 2A)

Diagnosis: Brook Silverside larvae hatch from adhesive, demersal eggs at lengths of 4-5 mm in July. They occur in rivers and lakes. Brook Silverside larvae are identifiable by their small size, short intestine, line of melanophores or myomeres along the notochord, and lines of melanophores on both dorsal and ventral body.

White Sucker (*Catostomus commersoni*) Meunier noir (fig. 2B)

Diagnosis: White Sucker larvae hatch from adhesive, demersal eggs at lengths of 8-9 mm in late May. They occur in rivers, creeks and lakes. White Sucker larvae are identifiable by their long narrow body, long straight intestine, and lines of melanophores along dorsal, mid-lateral and ventral body.

Rockbass (*Ambloplites rupestris*) Crape de roche (fig. 1D)

Diagnosis: Rockbass larvae hatch in nests from adhesive, demersal eggs in lengths of 4.5-5.5 mm in June and July. They occur in rivers and lakes. Rockbass larvae are identifiable by their laterally flattened body, unique intestine, and diffuse arrangement of melanophores.

Smallmouth Bass (*Micropterus dolomieu*) Achigan à petite bouche (fig. 1B)

Diagnosis: Smallmouth Bass larvae hatch in nests from adhesive, dermsal eggs at a length of 4.5-5.5 mm in June. They occur in rivers and lakes. Smallmouth Bass larvae are identifiable by their laterally flattened body, large size, and diffuse pattern of melanophores.

Black Crappie (*Pomoxis nigromaculatus*) Marigane noire (fig. 4A)

Diagnosis: Black Crappie larvae hatch in nests from adhesive, demersal eggs at lengths of 4-5 mm in late May and June. They live in rivers and lakes. Black Crappie larvae are identifiable by their short intestine, air bladder with dorsal concentration of melanophores, and late development of body pigment.

Northern Redbelly Dace (*Chrosomus eos*) Ventre rouge du nord (fig. 3B)

Diagnosis: Redbelly Dace larvae hatch from non-adhesive, demersal eggs at lengths of 5-6 mm in June. They occur in streams, marshes and lakes. Redbelly Dace larvae are identifiable by their long narrow body, intermediate length of intestine, lines of melanophores along dorsal and ventral body but none along the lateral body.

Carp (*Cyprinus carpio*) Carpe (fig. 3C)

Diagnosis: Carp larvae hatch from adhesive, demersal eggs at lengths of 3-5 mm in June and July. They live in rivers and lakes. Carp larvae are identifiable by the large diameter of their intestine, intermediate length of intestine, diffuse melanophores along dorsal and ventral body, and absence of line of melanophores along mid-lateral body.

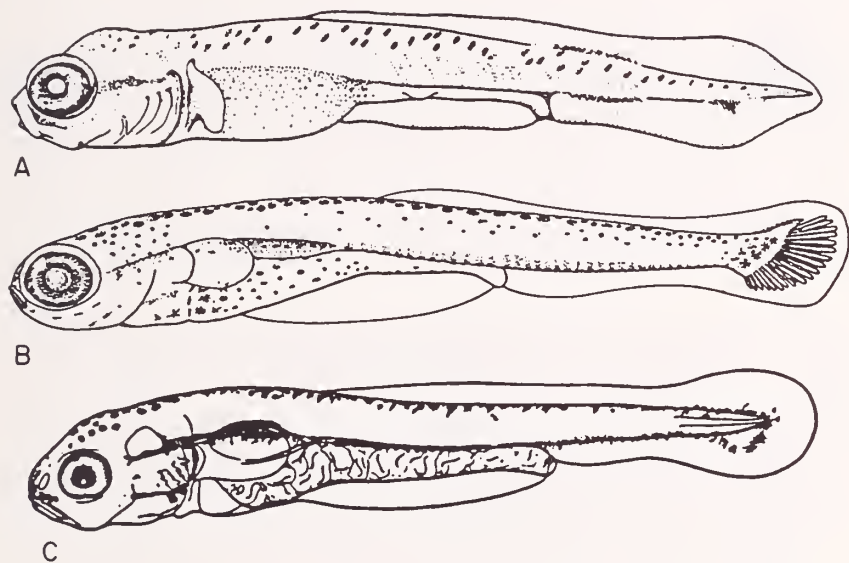


Fig. 3. Three larval fishes possessing a type of pigmentation which consists of a diffuse arrangement of melanophores along their back and lacking a distinct mid-lateral line.

A. Lateral view of Northern Pike, 14.0 mm (from Gihl 1957),

B. Lateral view of Northern Redbelly Dace, 6.8 mm (by Sally Gadd),

C. Lateral view of Carp, 7.7 mm (modified from Bragensky 1960).

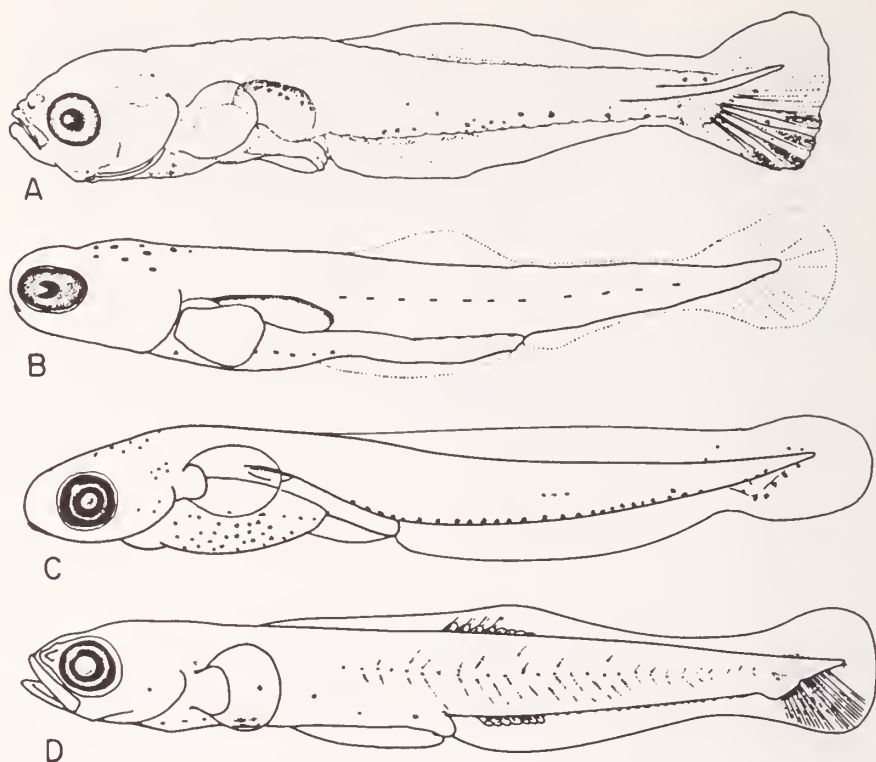


Fig. 4. Four larval fishes possessing a type of pigmentation which consists mainly of a lack of melanophores along their back.

- A. Lateral view of Black Crappie, 8.3 mm (modified from Conner 1979),
- B. Lateral view of Bluntnose Minnow, 6.4 mm (modified from Heufelder and Fuiman 1982),
- C. Lateral view of Banded Killifish, 6.0 mm (by Sally Gadd),
- D. Lateral view of Iowa Darter, 8.2 mm (from Cucin and Faber 1984).

Golden Shiner (*Notemigonus crysoleucas*) Chatte de l'est (fig. 2C)

Diagnosis: Golden Shiner larvae hatch from adhesive, demersal eggs at lengths of 3-4 mm in June, July and August. They live in rivers and lakes. Golden Shiner larvae are identifiable by their long narrow body, intermediate length of intestine, and lines of melanophores along dorsal, lateral and ventral body.

Common Shiner (*Notropis cornutus*) Méné à nageoires rouges (fig. 2D)

Diagnosis: Common Shiner larvae hatch from slightly adhesive, demersal eggs at lengths of 5-6 mm in June and July. They live in rivers, streams, marshes and lakes. Common Shiner larvae are identifiable by their long narrow body, intermediate length of straight intestine, and lines of melanophores along dorsal, mid-lateral and ventral body.

Bluntnose Minnow (*Pimephales notatus*) Ventre-pourri (fig. 4B)

Diagnosis: Bluntnose Minnow larvae hatch from adhesive, demersal eggs at lengths of 5-6 mm in June, July and August. They live in rivers, streams, marshes and lakes. Bluntnose Minnow larvae are identifiable by their long narrow body, intermediate length of straight intestine, unique shape of finfold, and lines of melanophores along dorsal, mid-lateral and ventral body.

Fathead Minnow (*Pimephales promelas*) Tête-de-boule (figs. 2E, 2F)

Diagnosis: Fathead Minnow larvae hatch from demersal, adhesive eggs at 4-5 mm in June and July. They live in streams, marshes and lakes. Fathead Minnow larvae are identifiable by their long, narrow body, intermediate length of straight intestine, and lines of melanophores along dorsal, mid-lateral and ventral body.

Banded Killifish (*Fundulus diaphanus*) Fondule barré (fig. 4C)

Diagnosis: Banded Killifish larvae hatch from adhesive, demersal eggs at 5-6 mm in July and August. They live in streams, rivers and lakes. Banded Killifish larvae are identifiable by their short intestine, diffuse arrangement of melanophores, and large triangle of melanophores in the heart region. When alive, the presence of white pigment cells over their entire body is unique among all Ottawa larval fishes.

Northern Pike (*Esox lucius*) Grand brochet (fig. 3A)

Diagnosis: Northern Pike larvae hatch from adhesive, demersal eggs at 7-9 mm in April and May. After hatching they use an adhesive organ (head sucker) to attach to aquatic plants or other hard objects for several days. They live in rivers and lakes. Northern Pike larvae are identifiable by their large body length, intermediate length of intestine, wide stomach region, and diffuse arrangement of melanophores over the dorsal body.

Brook Stickleback (*Culaea inconstans*) Epinoche à cinq épines (fig. 1C)

Diagnosis: Brook Stickleback larvae hatch from adhesive, demersal eggs at 5-6 mm in May and June. They live in streams, marshes and lakes. Brook Stickleback larvae are identifiable by their short intestine, diffuse arrangement of melanophores, and line of melanophores along mid-lateral and ventral body between anus and caudal peduncle.

Brown Bullhead (*Ictalurus nebulosus*) Barbotte brune (fig. 1A)

Diagnosis: Brown Bullhead larvae hatch from adhesive, demersal eggs at lengths of 6-8 mm in June and July. They live in rivers and lakes. Brown Bullhead larvae stay in nests during early development and later swim around in schools as juveniles. Free-swimming Brown Bullhead juveniles are identifiable by their large body, intermediate length of intestine, wide stomach region, four pairs of barbels around mouth, and diffuse pattern of melanophores over entire body.

Iowa Darter (*Etheostoma exile*) Dard à ventre jaune (fig. 4D)

Diagnosis: Iowa Darter larvae hatch from adhesive, demersal eggs at lengths of 3-4 mm in June, July and August. They live in rivers, streams and lakes. Iowa Darter larvae are identifiable by their short body length, intermediate length of intestine, sort vertical pigment line at the base of each pectoral fin, and parallel series of melanophore maculae lying between myomeres from the anus to the caudal peduncle.

* * *

In the next article, ten larval fishes which normally live in deep water habitats will be described and illustrated in similar fashion to the shallow water species described in this article.

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Two September Mushrooms to Collect with Care

CORRECTION: Please note that the two illustrations in this article in the last issue *Trail & Landscape* were inverted. The drawing of Aborted *Entoloma* shows one of the "aborted" forms, while the drawing of Glabrescent *Boletus* shows the typical pores on the under-surface of the cap. Our apologies to Ross Anderson for mixing up his illustrations. JMR

Visits to the Wild Bird Care Centre in Nepean

H. Virginia Webb

Last spring, Elizabeth Le Geyt, writer of the bird column in *The Citizen*, encouraged naturalists to support the efforts of Kathy Nihei. Kathy has operated the Wild Bird Care Centre within her home for the last two years.

Following a phone contact, I made several visits to Kathy's home, always to be greeted by an amiable, dedicated, and most knowledgeable wildlife enthusiast. Books relating to bird care adorn her shelves. Kathy attends her charges for long hours daily. "Bed time can be late, with morning arising at 5:30 a.m. when caring for the babies", she declared. All birds need constant attention. New fledglings are fed several times an hour, by hand. Family and friends have donated materials and assisted with enclosure construction.

With my beef heart in hand we descended to the aviary. A delightful visual array (also auditory) greeted me: a Kestrel isolated in a comfortable abode, a magnificent Great Gray Owl, two Northern Saw-whet Owls and one Screech Owl. In a much larger enclosure, living in harmony, were Mourning Doves, a Blue Jay, an American Robin, pigeons, a Northern Flicker, a Ruffed Grouse, Red-winged Blackbirds and Evening Grosbeaks. Pine needles, branches and water containers were strategically placed in each cage. Food supplies were constant.

"Under what circumstances did you commence this hobby?" I enquired. A neighbor rescued an injured hummingbird; she immediately elicited Kathy's advice. Last year, Kathy cared for approximately 1,500 birds of 115 species, with no financial aid to supplement her endeavour. She estimates her costs to be in excess of \$4,000 yearly. Friends and volunteers give some assistance in caring for the birds, and Kathy is applying for a financial grant in the future.

The dietary requirements of bird species in captivity intrigued me. Insectivorous members are fed a ground-up mixture of beef heart, chicken/duck starter, fish meal, vitamins, raisins and dry egg mixture. Waterfowl are fed baby strained corn or frozen corn, lettuce, the chicken/duck starter, soft "grains", grass, clover, and the meat mixture noted above. All fledglings are ensured adequate calcium intake for growth and development. Vitamins, dolomite and calcium sandoz may be administered, depending on individual needs.

Health and Welfare Canada donates mice of various sizes for the raptors. The Great Horned Owl was hand-fed. Mice are cut into adequate-sized pieces, then gently inserted between the

birds' mandibles. An extremely weak bird is initially fed (by medicine dropper) a glucose and water solution. Fruit-eating birds are offered seedless grapes as well as the meat mixture. Standard seed mix is available at all times.

Recently a Mourning Dove suffering from a severe auricular infection recovered fully following the administration of both topical antibiotic ointment and oral liquid antibiotics. Splinting, surgery and suturing are undertaken. Handlers must learn to manage birds appropriately and with care. Newly-hatched fledglings have a lovely warm "nest" - a $\frac{1}{2}$ pint plastic container lined with absorbent cotton and placed in a warm room. A veterinarian "birdlover" from Bells Corners is helpful to Kathy.

During ensuing visits, the aviary cared for Bohemian and Cedar Waxwings, Scarlet Tanagers and even some exotic Diamond Doves. "People acquire birds as pets, then lose their commitment to them", Kathy noted. One exotic species was sent by the Humane Society to the aviary. The Great Gray Owl was transferred to the McKeever's aviary in Vineland. Hopefully he will mate in captivity. This owl possibly will never fly again.

Healthy birds are returned to their original locales by Kathy, if at all possible. She has an excellent rate of "survival" for her injured and ill birds. She maintains careful records of all her cases.

How might we encourage Kathy Nihei? Assistance in the form of donations, items used on a daily basis, and volunteer time would be greatly appreciated. The following are needed:

1. a volunteer to initiate and maintain a one-metre square earthworm farm;
2. an individual to raise meal worms;
3. a volunteer to collect pine needles;
4. volunteers to collect berries in the summertime - blueberries, chokecherries, blackberries, honeysuckle fruit;
5. indoor/outdoor carpeting;
6. beef heart; bird seed;
7. Q-tips, peroxide, cotton swabs, facial tissues, surgical steel scissors, needle drivers, 2-cc syringes, sutures;
8. a magno lamp, $\frac{1}{2}$ -m diameter, with an adjustable arm. Gunshot pellets could be removed with greater ease;
9. Electrolux vacuum bags, Javex, medium-sized rubber gloves, Ivory or Palmolive liquid soap, garbage bags;
10. a child's shallow wading pool - for the waterfowl!

This naturalist truly enjoyed all visits to the Wild Bird Care Centre. Please contact Kathy Nihei if you wish to support her in any manner at 73 Majestic Drive, Nepean, Ontario K2G 1C9, telephone (1-613-)226-6443. ▀

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Coming Events

arranged by the Excursions and Lectures Committee
Philip Martin (729-3218), Chairman

Times stated for excursions are departure times. Please arrive earlier; leaders start promptly. If you need a ride, don't hesitate to ask the leader. Restricted trips will be open to non-members only after the indicated deadlines.

Saturday LATE FALL MIGRANTS

10 Nov. Leader: Bob Bracken (728-3495)

8:00 a.m. Meet: Loblaw's, Carlingwood Shopping Centre
Carling Avenue at Woodroffe Avenue

Bob will be looking for some of the migrants that pass through the Ottawa area late in the fall, including hawks and waterfowl. Dress warmly.

Tuesday OFNC MONTHLY MEETING

13 Nov. SHARING A DREAM

8:00 p.m. Speaker: Glen Threlfo

Meet: Auditorium, National Museum of Natural Sciences, Metcalfe and McLeod Streets

Renowned Australian wildlife photographer Glen Threlfo will take us on a spectacular film journey through some of the most beautiful areas of Queensland and the Northern Territory. Included are the tropical city of Cairns and the neighbouring Atherton tableland, wild and wonderful Kakadu National Park near Darwin, Carnarvon National Park featuring the spectacular Carnarvon Gorge, and the world-famous O'Reilly's Guesthouse in the Lamington National Park in southern Queensland. In just a few years, Glen Threlfo has established himself as one of Australia's foremost nature photographers. He is visiting North America to promote a nature tour, and we are fortunate to have him come to Ottawa to show his superb documentary film and tell us about his tour. This is a unique opportunity. Don't miss it.

Sunday GENERAL OUTING IN GATINEAU PARK

25 Nov. Leader: Philip Martin (729-3218)

9:00 a.m. Meet: National Museum of Natural Sciences
Metcalfe and McLeod Streets

Participants will travel by car into the park to view nature closeup at this normally quiet time of

the year. There could possibly be a visit to the National Capital Commission interpretation centre at Old Chelsea.

Sunday WINTER BIRDS

9 Dec. Leader: Bruce Di Labio (729-6267)

8:30 a.m. Meet: National Museum of Natural Sciences
Metcalf and McLeod Streets

This half-day trip will visit several areas to find some of the interesting bird species that make Ottawa their home in the winter. Dress warmly. The Dinobus is being provided free of charge by the National Museum of Natural Sciences.

Tuesday OFNC MONTHLY MEETING

11 Dec. A DREAM COME TRUE - AUSTRALIA IN APRIL

8:00 p.m. Speakers: Roger Taylor and Fran Goodspeed

Meet: Auditorium, National Museum of Natural Sciences, Metcalfe and McLeod Streets

Roger and Fran will present in pictures their vivid impressions, the magnificent scenery, and the flora and fauna encountered during the Club trip to the eastern part of Australia in April of this year.

Tuesday ANNUAL BUSINESS MEETING

8 Jan. Meet: Auditorium, National Museum of Natural Sciences, Metcalfe and McLeod Streets

This will be the 106th Annual Business Meeting of The Ottawa Field-Naturalists' Club. Carried over from the last Annual Business Meeting is a motion to change the name of the Club. More information will be available in the next issue of *Trail & Landscape*. Be an active member of the Club and come out for this meeting.

DON'T FORGET THE POINT PELEE TRIP

The Club will again be travelling to Point Pelee for the world-famous spring bird migration. The date of departure is May 16th, returning on the 20th. The trip is on only if there is a good early response. If you are interested, contact the Club number (722-3050).

DEADLINE: Material intended for the January-February issue must be in the Editor's hands before October 27 at the latest.



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